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China Report

SCIENCE AND TECHNOLOGY

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27 August 1985

CHINA REPORT

SCIENCE AND TECHNOLOGY

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CHINA'S SCIENTIFIC RESEARCH SYSTEM REFORM DISCUSSED

Shenyang GAIGE ZHISHENG [VOICE OF REFORM] in Chinese No 4, 10 Apr 85 p 31

[Interview of Wu Mingyu by HUASHENGBAO reporter Ma Lili [7456 0500 7812]:
"The Concept of China's Scientific Research System Reform; A Visit to
Wu Mingyu [0702 2494 3842], Vice Minister of the State Science and Technology
Commission"; Date and place not given]

[Text] Wu Mingyu is the vice minister of China's State Science and Technology Commission. Our staff reporter recently interviewed him and asked him to tell overseas' readers about China's scientific research system reform.

Question: Mr Wu, please tell us about the major disadvantages of China's present scientific research system.

Answer: People both in China and abroad have presented many very good views on this problem. An expert at Japan's Yecun [phonetic] Research Institute has said that, on one hand, China has been able to produce atomic bombs and synthetic insulin, and, on the other, that a lot of her routine production technology is amazingly backward. He thinks that the major reasons creating such extremely uncoordinated phenomena are first that as a system, China's S&T is divorced from production, and second that traditionally, Japan has stressed technology and China has even more emphasized scientific thinking. I think that this viewpoint rather accurately reflects China's status quo.

In addition, we have paid quite a lot of attention in the past to making things large and complete, and it seems as if we have wanted to do everything that the United States, England and Japan have done and surpass advanced world standards in all areas. But in what we have actually done, we have encountered the problem of fund difficulties everywhere. China's 1984 outlay for scientific research was 7.9 billion yuan but the annual U.S. scientific research outlay is roughly \$80 billion. Therefore, we cannot do everything that the United States does. In fact, as Hu Yaobang has said, if the national economy cannot be pushed forward, everything is idle talk.

Specifically, China's scientific research system has the following three major disadvantages. First, our S&T system motion has relied simply on administrative measures for its impetus and basically neglected the market

mechanism and the role of economic levers. Second, we have overdeveloped independent research institutes, neglected enterprise development work and formed a top-heavy scientific research system. China now has over 9,300 research institutes, and although the total number is less than that in the United States and Japan, yet the number of those which are independent of enterprises is much greater than that in the United States and Japan. Less than 2,000 of the over 16,000 U.S. research institutes are independent of enterprises and 90 percent of Japan's research organizations are linked to enterprises, yet far more than half of our research institutes are independent of enterprises. Third, we have not formed a system which enables qualified young personnel to constantly grow and fully develop their roles. Our scientist and technician management system is rigid and qualified personnel are unable to circulate; after leaving college, many people stay in one unit all along and are unable to move. The average age of the Chinese Academy of Sciences' Study Department committee members is 73 and only 4 are under 50. Statistics for 1984 show that the average age of China's employed professors and associate professors is 56.

Question: Will you please discuss what major measures this reform is prepared to adopt?

Answer: The goal of this reform is to promote better coordination between S&T and the economy and to allow S&T to create more wealth for society. The present tentative plan is to carry out reform in the following four areas: to reform the fund allocation system; to open technical markets; to strengthen the technical development capacity of industrial enterprises; to accelerate the process of lowering the ages of the key S&T ranks.

China's scientific research funds were all basically allocated by the state in the past. Ninety-nine percent of them were allocated by the state 3 years ago, but we have made some experiments in the past 2 or 3 years and state fund allocation has dropped to approximately 90 percent. In the future, we want to gradually reduce the proportion of state financial fund allocation and increase that of scientific research funds provided by enterprises. This certainly does not mean that the absolute amount of state fund allocation will decrease. Hu Yaobang and Zhao Ziyang have both said that the amount of state fund allocation will not change and will even increase somewhat year by year, but that new financial sources for S&T research must be opened up. We cannot "stereotype" various types of research institutes, organizations such as astronomical and meteorological observatories which engage in basic research cannot take profits as their goals and the state will still use the system of overall financial control of them. Our goal is to encourage competition, promote faster development of the advanced and stimulate the backward to catch up.

Moreover, we must conscientiously open technical markets and carry out compensation for technology transfers. The State Council published technology transfer rules on 10 January 1985. China put a patent law into effect on 1 April 1985. These have both created the conditions to open technical markets.

As to linking up scientific research organizations with factory enterprises, we are not prepared to use the method of administrative orders because we have learned lessons in this area in the past. We will encourage them to voluntarily link up based on mutual benefit. Of course, certain essential national laboratories must still be retained.

Lowering the age of the key S&T ranks is also a very important aspect. China has traditionally respected age and ability. We hope that the older generation of scientists will guide and support the less advanced while conscientiously carrying out a retirement system. In choosing young people, we must break certain past limitations and restrictions and help young people to mature quickly. China has formed a system for several decades which makes it very difficult for qualified personnel to circulate. We will from now on encourage the rational circulation of qualified personnel, allow all areas to adopt essential measures to attract qualified personnel and eliminate stagnant conditions. S&T and planning organizations and colleges and universities will carry out an appointment system in which they will be able to both hire and fire. Of course, steps to system reform in this area must be taken safely in order to not cause people to lose their basic sense of security.

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CSO: 4008/356

GUANGDONG'S SPECIAL ZONE CONSTRUCTION, PATENT LAW RELATED

Beijing ZHONGGUO ZHUANLI [PATENT REVIEW OF CHINA] in Chinese No 5, 1985 p 13

[Article by Cai Maolue [5591 5399 3970]: "Construction of Guangdong's Special Zones and the Patent Law"]

[Text] Guangdong's special zones include Shenzhen, Zhuhai and Shantou, 3 of the 4 special economic zones [SEZ] which the state decided to open up in 1979, Guangzhou and Zhanjiang, 2 of the 14 coastal port cities which the state decided to further open in 1984 and the Hainan Island Economic Development Zone, forming a "new coastal crescent-shaped" zone in Guangdong Province.

The industrial base of Guangdong's special zones is quite good and concentrates most of Guangdong Province's processing equipment and technical forces in areas such as light industry and the textile industry. Several cities, such as Guangzhou, are the seat of Guangdong's higher education and have quite strong S&T forces. This has created the necessary conditions to absorb, digest, create and transfer to the interior imported technology and equipment.

The state has clearly stipulated the duties of setting up the SEZ's and opening the coastal cities. They are principally to use foreign capital, import advanced technology and management and administration methods and enable the economic construction of the SEZ's and the coastal cities to rapidly develop. The key to China's socialist four modernizations is S&T modernization, but the disparity between China's S&T standards and advanced world standards is still very great and our S&T forces are still very weak and far from being able to adapt to the needs of modernization. In order to accelerate the pace of Guangdong's S&T modernization, its special zones will have to engage in mutual exchange with all countries throughout the world, import technology and master, use and develop other countries' advanced technology, equipment and management experience.

A problem which exists in the work of importing technology and equipment to Guangdong's special zones is that the proportion of rather advanced imported technology is quite small. There are many reasons creating this state of affairs, one being that China's economic legal system is unsound. Since China had no patent law in the past, foreigners' advanced technology could not acquire patent rights in China. They worried that if they

transferred advanced technology to China, it would be arbitrarily proliferated and copied since it had no patent protection. Thus, when transferring advanced technology, they would either demand high prices or not export top-grade technology. Only certain service trades and labor-intensive primary processing industries are now truly having joint capital success, while progress is slow in some knowledge- and technology-intensive trades.

China issued the "PRC Patent Law" on 12 March 1984 and put it into effect on 1 April 1985. China's patent law is geared to world needs, and advanced foreign technology and equipment can apply for patents in China and be legally protected according to its stipulations. Thus, enterprises and individuals from foreign countries can confidently transfer advanced technology to China and engage in joint capital management and cooperative management and development. Guangdong's special zones should fully utilize the favorable conditions put into effect by China's patent law, use state rendered "special policies and flexible measures" and preferential investment conditions, fully absorb foreign capital and import advanced technology and equipment, develop their construction and accelerate China's socialist modernization.

Another effect of China's patent law is that it promotes the utilization of patent documents by scientists and technicians. It also enables comrades of foreign trade and management departments to benefit from using patent documents. Since China had no patent law in the past, comrades of some management and foreign trade departments were unfamiliar with patent knowledge. When importing technology and equipment, they had an indistinct picture of advanced world technology conditions, were unable to fully use patent documents to scrutinize and confirm the advanced nature of imported items and often believed the statements of foreign businessmen, so that some imported technology and equipment was even obsolete technology and equipment from the 1930's and 1940's. Since China's patent law has been put into effect, complete patent work organizations and patent document service organizations have been correspondingly established. When importing technology and equipment hereafter, relevant patent service organizations can help solve and judge the advanced nature of technology, and this has provided a powerful technical guarantee for Guangdong's special zones to use foreign capital to import advanced technology and equipment.

Through the past several years of efforts, definite successes have been achieved in Guangdong's special zone construction in the area of using foreign capital to carry out urban construction and import advanced technology and equipment. Many new enterprises have been set up. Some old enterprises have been transformed, new products have been developed and the quality and grade of some products have been improved. For instance, through 4 years of construction, the formerly bleak and desolate small town of Shenzhen has begun to take the shape of a modern city in which skyscrapers stand tall and erect, factories stand in great numbers and shops are placed closely side by side. The city of Shenzhen's 1983 gross industrial output value and revenue increased over 10-fold over that of 1979. Through economic reform, importing from abroad and linking up with the interior, the city of Guangzhou's 1984 gross industrial output value topped 13.1 billion yuan

and revenue topped 3.3 billion yuan, increasing 10.3 percent and 5.3 percent, respectively, over that of 1983. We believe that through China's economic system reform and with the assistance of China's patent law, Guangdong's special zone construction will be able to vigorously develop and make greater contributions to China's socialist four modernizations.

12267

CSO: 4008/364

NATIONAL DEVELOPMENTS

ADVANCES IN MACHINE PARTS CODING DESCRIBED

Beijing ZHONGGUO BIAOZHUNHUA [CHINA STANDARDIZATION] in Chinese No 7, 84 pp
19-22

[Article by Shen Yinguan [3947 6892 1351], Yichang Prefecture [Hubei] Farm
Machinery Plant: "A Discussion of the Coding of Machinery Parts"]

[Text] Following along with developments in science and technology, the
machinery manufacturing industry is facing an age of product diversification.
As the kinds of products increase, the batch lots decrease, and renovation
time is getting shorter.

According to incomplete statistics, more than 80 percent of the machinery
businesses in China are multi-product, middle and small lot production
industries, which use advanced production methods, are organized into
specialized production, and which rely upon a restructuring of the entire
industrial system and a level of standardization for products. That being so,
can we base ourselves upon our national condition, and confronted with the
features of traditional production of machinery make use of the theories and
methods provided by the new science and technology? Can we study the
standardization and rationalization of machinery part coding and provide a
common data base for enterprises, utilize computers to allow relevant designs,
relevant production, and relevant management for the improvement of labor
productivity, and to obtain the best results for the national economy? This
is an objective requirement for standardization by the modern machinery
manufacturing industry, and at the same time is an important characteristic of
modernization for the work of standardization itself.

I. What Is Parts Coding, and How Are They Coded?

What is called parts coding is based on coding rules (code standards), which
use a numerical listing to represent the characteristics of a part.

The coding process is not really difficult. Simply put, it is to search for
relevant characteristics of a part using predetermined coding standards. Part
information needed is the meaning represented by each digit in the coding
standard. That source is mainly the part blueprints, so for some it will be
necessary to refer to relevant technical documents.

II. Code Standards

Code standards are unified standards for coding of parts.

Classification coding methods originated in Group Technology (hereafter, GT), which was a highly effective strategic organizational measure by the machinery manufacturing industry for changing the backward aspect of multiple type medium and small batch production, and is an integrated new technology for improving production efficiency and scientific management. With the development of GT, classification of coding systems became increasingly scientific, rational, and international with more than 100 types, until one of them, the Opitz coding system, has been generally adopted and used by all countries of the world. The Opitz coding standards can more fully express the form, structure, and technical characteristics of parts than can non-coded classifications, and can be retrieved by means of computers. Numerals are divided into main numbers and auxiliary numbers, where the main number is the form number, using five digits, and the auxiliary number is called the supplementary number, reflecting materials, blanks, accuracy, etc., and using four digits, where each digit has 10 possible numerals.

The JCBM standard is a unified part coding standard for the Chinese machine tool industry, which is currently also an official partial standard, guiding the machine manufacturing industry toward unified part coding. This standard is based on the Opitz system, integrating the characteristics of China's machine industry under the 1979 formulations, and similarly is suited to medium and higher scale machine manufacturing factories of multiple products in medium and small batches (for relevant details, see the standards, abridged in this article).

III. The Function and Significance of Parts Coding

1. Preparatory work for a fundamental improvement in production technology.

In factories at present, because part blueprint coding does not reflect the parts situation, there are always similar parts configurations that could be combined completely into one part, but instead are redesigned and reproduced as different parts.

After parts coding, the blueprints are handled together by codes, so the designers can first determine the parts configuration, then identical or similar parts blueprints can even be retrieved from files for analysis and comparison according to classification codes by computer. Existing parts blueprints can even be used, or can be used after partial revision of similar parts blueprints, so that only if a suitable blueprint cannot be found does one need to be redesigned. Based on relevant descriptive material, and after coding, a factory's parts blueprints are edited and standardized, parts design books are drawn up according to groupings. More than 75 percent of blueprints can be reused, which greatly speeds up product design time.

This method of retrieval can be used for products, components, and parts, and can be used as well in the formulation of the technical process, as well as in the design of technical equipment.

By using parts coding we can standardize existing parts, as well as their processing technology and technical equipment, which will greatly improve the level of standardization in enterprises. Man-hour quotas can then be simplified to be methods of comparison, which simplifies technical management.

This method of retrieval and standardization work can both reduce the amount of work for product design, technical design, and design of technical equipment, as well as greatly reduce the number of kinds of parts. It can also greatly decrease part types, unify technical methods, improve production batches, ensure product quality, and shorten the time for producing technical equipment. Consequently, we can use large batch technology and methods, we can improve the level of automation in production, and we can make a step toward lowering product costs.

2. Parts coding is the basis of promoting Group Technology.

Of help to classificatory coding of parts is to gather all parts that are technically identical or similar together into a part family, which will allow medium and small batch production of multiple parts to have the benefits of large scale production as far as design, manufacturing, and management are concerned. Various domestic and foreign materials have provided many of the economic results of group technology, as for example, reducing expenses by 30 to 40 percent, reducing by 20 to 30 percent both the costs for design of technical equipment and the time for technical drafting, reducing the time for both machine tool adjustments and installation of workpieces, etc.

3. The information provided by parts coding is of help to statistical analysis of the characteristics and distribution situation for various parts, and this is an important basis for factory design, the technical transformation of enterprises, and equipment model selection.

4. By using parts coding, there can be an accurate analysis of the rate of use of equipment, which is beneficial for rational manufacture of equipment, and greatly simplifies the engineering of numerically controlled machine tools.

5. The ultimate goal of coding is to provide conditions for computer creativity in the field of production management.

After promoting GT, as well as carrying out the process of the rationalization of parts design, parts coding, and similarity data can be directly entered into computers, which is a situation beneficial to computer-aided design (CAD) and computer-aided manufacturing (CAM). At the same time, group production management had changed the traditional group manufacturing of machines, replacing it with group processing units and group assembly lines, which has allowed scientific and optimized production management for enterprises.

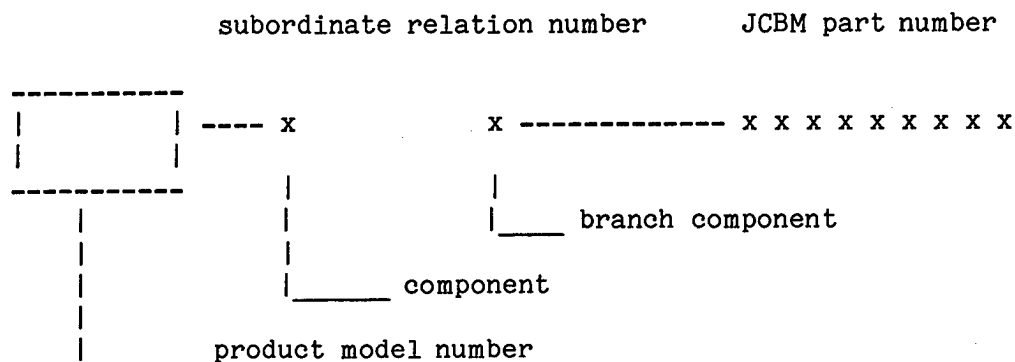
VI. The Relations Between Parts Coding and Product Patterns and the Numbering of Design Documents.

The coding of parts has broken down the divisions between industries, it has eliminated product barriers, and machine parts are completely numbered. Then,















with the two methods of "subordinate numbering" and "classification numbering" as formulated by the numbering principles of product samples and design documents, as far as parts are concerned, those codes refer to particular products.

The primary differences between parts coding and parts numbering are: coding reflects various characteristics, as for example, form characteristics, structural characteristics, technical characteristics, etc.; while the latter cannot do that, but often reflects the subordinate relations of parts within products.

This article has come up with a product sample and design document numbering principle with the advantages of both methods for the convenience of sample management, to be of help in the exchange of technology, which is suitable for use by machine manufacturing enterprises. I present it for public discussion.



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1. Code Names for Product Designs and Design Documents
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4. Explanation
5. Overall diagram
6. Model number
7. General assembly diagram
8. If the general assembly diagram has the material needed for the overall diagram, it may serve as the overall diagram
9. Component assembly diagram
10. Components directly subordinate to the overall diagram
11. Products may have 9 directly subordinate component code names

12. First level components
13. Products may have 9 one part component code names
14. Second level components
15. Products may have $9 \times 9 = 81$ second level component numbers (branch components)
16. Parts diagram
17. Overall diagram directly subordinate parts
18. No limit to part numbers
19. Parts in the overall diagram subordinate components
20. Parts directly subordinate to first level components
21. Parts in the second level components
22. Separate or component parts (combined parts)
23. Based on combination parts and subordinate relation numbers
24. Other supplementary designs
25. Hydraulic pressure key diagram
26. Annotation number
27. Product model number
28. This type of pattern trailing comment number is found in relevant technical documents
29. Key electric diagrams
30. Base diagrams
31. Packaging diagrams
32. Design documents
33. Detailed tables of special parts (basic parts) (commonly used parts)
34. Design document code names are comprised of product model number (code name), to which is added design document type and classification annotation number
35. For annotation numbers refer to the annotation numbers for the JB/Z158-81 design document
36. Detailed table of standard parts
37. Detailed table of foreign parts
38. Usage manuals
39. Certificates of qualification
40. Packaging units
41. Technical conditions
42. Document catalogue
43. Design catalogue
44. Technical tasking documents
45. Calculation documents
46. Spare parts catalogue
47. Accessories catalogue

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CSO: 4008/361

NATIONAL DEVELOPMENTS

HUANG HUANG INSPECTS SYNCHROTRON PROJECT

OW230521 Hefei Anhui Provincial Service in Mandarin 1100 GMT 17 Jul 85

[Excerpts] Secretary Huang Huang and Deputy Secretary Xu Leyi of the provincial party committee on the afternoon of 5 July inspected a state synchrotron radiation laboratory being built at the new campus of the China University of Science and Technology in Hefei's Southern suburb, according to ANHUI RIBAO.

At an office on the construction site, Comrade Huang Huang was given a briefing by Bao Zhongmou, vice president of the university, on the arrangements for the project and the progress of its construction. Then, construction unit engineers briefed him on the project's components.

On behalf of the provincial party committee and the provincial People's Government, Comrade Huang Huang extended his cordial regards to the engineers, technicians, and workers participating in the project's design and construction.

Comrade Huang Huang said: The state synchrotron radiation laboratory in Hefei is a key project of the Chinese Academy of Sciences and Anhui Province as well as of the country. The provincial party committee and the provincial People's Government firmly support the project's construction. Vigorous efforts should be made to solve problems in the project in order to ensure its smooth construction.

Accompanied by leaders of the university and the construction unit, Comrades Huang Huang and Xu Leyi inspected the construction site.

All laboratory equipment will be installed in 1987, and the laboratory will go into operation by the end of 1988.

CSO: 4008/2023

NATIONAL DEVELOPMENTS

TIANJIN'S NI ZHIFU ON SCIENTIFIC RESEARCH

SK190551 Tianjin TIANJIN RIBAO in Chinese 20 Jun 85 p 1

[Text] Recently, Comrade Ni Zhifu went to about a dozen specialized scientific research units and the research institutes of some higher educational schools, including the Tianjin Electric Drive Institute [Dian Chuan Suo 7193 0278 2076], the metallurgical material research institute, and the silicate research institute of the Ministry of Machine Building, to conduct investigations and study and to give guidance to their work. Yang Jingheng, Standing Committee member of the municipal CPC Committee, and comrades of the scientific and technological department of the municipal CPC Committee also joined the investigations and study.

In the Tianjin Electric Drive Institute of the Ministry of Machine Building, Ni Zhifu went to laboratories and production workshops to talk with scientific and technical personnel, learn about scientific research equipment and the conditions of books and other means of information, and hear a report by the responsible person of the institute. He said: "The first priority task of scientific research units is to develop new technology, score technological achievements, transfer these achievements to others, and then develop more advanced technology. Research units should perform multiple functions. They should both develop technology and render technical consultation as well as train competent personnel." "There is a question that everybody should attach importance to and handle well. That is, enterprises should take the initiative in cooperating with higher educational schools and research units when importing technology, and should do a truly good job in absorbing and digesting the imported technology. We should inspect how the units have assimilated their imported equipment and technology. In the future, we should pay attention to the problem that too few specialized personnel are sent abroad for fact-finding." He also pointed out that scientific research units should change the situation of "eating from the common big pot" in terms of distribution, and truly implement the principle of "more pay for more work" so that the wages of the people with greater contributions and of those with small contributions will be different.

Seeing that most equipment of the synthetic material research institute is outdated, Ni Zhifu said: "We should allow research institutes to import some advanced equipment and instrument whose standards are beyond our capability in order to promote scientific research work. We should fully utilize the

imported equipment and instruments." When some research institutes reported the urgent need for a small amount of foreign exchange to import some scientific research materials, Ni Zhifu said: "Some people hold that scientific research units do not earn foreign exchange. This is a question of understanding. Although they do not earn foreign exchange directly, some research units promote production and save a great amount of foreign exchange through developing and transferring new technology. In this way, they actually indirectly earn foreign exchange. We hope that banks will consider this and give appropriate preferential treatment and support to them in terms of foreign exchange and loans.

Ni Zhifu was very pleased to see the various food additives produced by the industrial micro-organism research institute. Upon hearing that some research findings have blossomed in Tianjin and borne fruit in other areas, he said: "It is a good thing to have Tianjin's flowers bear fruits in other areas. We call this technology transfer and spread. However, we should solve the present problem that some research projects do not bear fruit. The reason some research findings are not applied is not only that some research units are conservative and have problems in their understanding but also that they lack intermediate experiments and fail to successfully transit the trial production of samples to the batch production of finished products. Scientific research units should arm themselves with guaranteed economic sources. Plants may establish research institutes and research institutes may also establish plants individually or jointly with enterprises. They may buy shares with their technology as capital and draw a certain percentage of benefit so that they can increase their income and arm themselves."

During his investigations in the metallurgical material research institute, Ni Zhifu said: Scientific research units should intensify material and technology research and other basic research work, provide complete sets of technology and equipment to the new materials and new products they successfully produced, and strive to improve the overall industrial level of our municipality. Speaking on the enforcement of the director responsibility system at research institutes, he said: "We hope that you will make more explorations to gain experiences because the situations of research institutes may be different from those of plants. However, we can still learn from the basic experiences in the implementation of the system in plants. In the field of party committee work, the secretary is the top leader, and in the field of administrative work, the director is the top leader. Party committees, administrative personnel, and workers should work in coordination and make concerted efforts. With regard to the major issues concerning the overall situation, party committees should also conduct study and offer their opinions. They should also supervise and guarantee the work of the institutes. Institute directors should not only pay attention to the performance of the function of experts but also follow the mass line and give full play to the creativity of technical personnel and workers."

When conducting investigations and study in the metrological institute, Ni Zhifu stressed the need for successful metrological and standardization work and the adoption of international standards as much as possible. The imported large instruments and equipment of various units should be fully

used. They should not only serve the units they belong to on a priority basis but also serve other units of the whole municipality. We should link the various units to form a network, and exercise unified and coordinated management of it. We should educate leading cadres on standardization and metrological knowledge.

On 13 June, the municipal CPC Committee called together the comrades of the scientific and technological department of the municipal CPC Committee, the municipal scientific and technological committee, the municipal planning committee, the municipal economic committee, and the municipal financial bureau to hold a forum. Comrade Ni Zhifu introduced in detail what he had learned about the research institutes where he conducted investigations. He pointed out: When implementing the CPC Central Committee's decision on reform of the scientific and technological structure, we should give less empty talk and do more solid work. There are many problems at lower levels. This investigation tour was only a beginning, and a great amount of work needs to be done with our concerted efforts. When problems arise, we should not evade them but should discuss ways to solve them. We should work out some feasible methods and specific policies suitable to Tianjin's actual conditions in order to truly help grass roots units solve practical problems. We should understand what our problems are through study and implementation of the CPC Central Committee's decision and through investigations and study at grass roots units, and adopt effective measures to accelerate our pace of scientific research.

CSO: 4008/2023

APPLIED SCIENCES

AUTOMATIC ROUTING SYSTEM FOR PRINTED CIRCUIT BOARDS DESCRIBED

Beijing JISUANJI XUEBAO [CHINESE JOURNAL OF COMPUTERS] in Chinese Vol 8,
No 1, Jan 85 pp 75-78

[Article by Yang Daoyuan [2799 6670 3104], Beijing Academy of Chemical Engineering, and Gao Jianyu [7559 0494 1342], Institute of Computer Technology, CAS: "An Automatic Routing System for Nonstandard Two-Sided Printed Circuit Boards"]

[Text] 1. Brief Introduction to the Routing System

This system is based on a NOVA computer with 32 Kbyte of internal storage and a word length of 16 bits. It is primarily used for automatic routing on non-standard printed circuit [PC] boards. These boards have solder pads of various sizes, connecting traces of various widths, and many thin traces branching from the thick traces. Use of mini- or microcomputers for automatic routing on such boards is extremely important.

For user convenience there are three data input formats: grid coordinate format, component number format, and cursor keyboard entry format.

Once the data are entered, line allocation is performed, and routing is then begun. The nonstandard boards processed by this system include two different trace widths. The wider traces are 1.2-2.0 mm across, and the narrower traces 0.3-0.5 mm across. There are also two solder pad diameters, 2.5 and 1.4 mm.

The layout results can be displayed on a 4014 unit or drawn by a plotter. The system has a variety of auxiliary programs that can be used to refine the results. Finally, after optimization, the system can output a paper tape for photoplotting a negative, or the red litho master itself can be cut directly.

A block diagram of the system is shown in Figure 1.

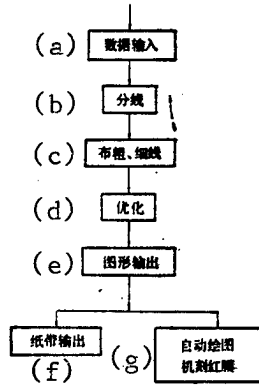


Figure 1. Block Diagram of Routing System

Key:

- a. Data input
- b. Trace allocation
- c. Routing of thick and thin
- d. Optimization
- e. Graphic output
- f. Paper tape output
- g. Automatic plotting and machine cutting of red master

2. Structure of the Routing System

Since the methods used in the system are similar to those described in Refs. 2 and 3, here we will limit ourselves to describing two characteristics of the system.

A. Use of Bits To Represent Points on the PC Board

In the computerized automatic wiring layout process, the characteristics of every point on the board must be entered into the computer in order for layout work to proceed properly. Usually the board is divided manually into numerous small grids, each [made] of which is actually one point on the PC board. In order to save internal memory space, each bit in each memory location of the computer represents one point on the PC board. This saves memory space and produces a one-to-one correspondence between a memory area in the computer and the printed circuit board, which simplifies lookup and the solution of difficult routing problems. It should be emphasized that, depending on the complexity of the problem, 1, 2 or 3 bits can be used to represent a single point on the board; this feature should be flexibly utilized in accordance with the specific problem.

Definition: When the bits in an area of internal storage are used to represent a point on a PC board so that there is a one-to-one correspondence between this area of memory and the board, the memory area is called a "bit map" of the board. Within the bit map, each logical connection bit represents a channel on the PC board. Therefore, computerized routing can be performed in the bit map.

B. Use of a Flow Data Structure

The system has two bit maps: one for the heavy grid, representing the thick traces, and the other for the light grid, representing the thin traces. Each bit map is in turn divided into two sections, representing the two faces of a two-layered PC board. Two wiring result tables, one for thick traces and one for thin traces, record starting points, "borrowed" hole end points and various other information. The two interconnection tables record the starting points and end points for the thick and thin connections which the user wishes to make. The two single-hole tables record the positions of the holes of the two different diameters.

Routing involves a large amount of data and many tables, and all characteristics must be entered into memory one at a time, so that a large memory area is required. In order to save internal memory space, all of the tables described above are placed on magnetic disk. Only a single bit map is present in internal storage; the wide trace bit map when routing the wide traces, and the narrow trace bit map when routing the narrow traces. The memory also contains a partial interconnection table with a capacity of 128 interconnections, and a partial results table of only 512 locations.

In the wiring layout process, the interconnection table stored on magnetic disk is divided into 128-trace sections, and one section is transferred to the partial interconnection table area in internal storage. When layout for this section is completed, it is replaced by another section. If the partial results table becomes full, it is transferred to the results table area on magnetic disk and the recording of new routing results is begun.

Single holes are brought together during processing of the data and are stored in the hole table on magnetic disk. They are not again returned to internal storage.

3. Problems and Methods of Solution

A. Because traces of two different thicknesses are used, the problem of what wiring sequence to use arises. The method used in the system is as follows.

Let S be the set of all large and small solder pads and single holes used in the mixed routing process, let D_i be the width of the i -th type of trace, with $D_i < D_{i+1}$, and let L_i be the set of routing results for the i -th trace width ($i = 1, 2, 3, \dots$). Then, in the mixed routing process, only when all traces of width D_{i+1} , D_{i+2} have been laid out can the routing of lines with diameter D_i be begun; when routing lines of diameter D_i , the routing barrier is

$$M_i = S \cup L_{i+1} \cup L_{i+2} \cup \dots.$$

The basic conception of this method is that the wide traces are routed before the narrow traces, and that the previously laid out wide traces are barriers to the subsequently laid out narrow traces.

If during mixed routing we used the method normally used with a single wiring grid, then the wide and narrow traces would use different channels. If a narrow trace occupies one channel, then a wide trace must occupy two or more channels. Thus a new problem arises: the difficulty of writing a program that will lay down one wide trace in two or more parallel empty channels. Since our system uses mixed wiring with traces of two different widths, we use the variable grid method, i.e., the area on the board represented by the grid for the wide traces is 4 times that of the grid for the narrow traces, and thus a channel used in laying out a wide trace is equivalent to two of the channels used in laying out narrow traces.

Thus both wide and narrow traces are laid out in single channels, and accordingly we can use the same program for the two different types of channels, which solves the routing problem in a simple manner.

C. Method of Data Entry

Figure 2 [on following page] shows the bit map for the narrow-trace grid and the partial inter-connection table and partial results table that are permanently resident in memory, along with a diagram of an actual board.

When layout is begun, all starting points, end points and single holes are entered separately into the interconnection tables and hole tables, and 1's are placed in all of the corresponding locations in the two bit maps (e.g. points A, D, H, K, F, G on the board shown), which are then stored on magnetic disk.

The wide traces are laid out before the narrow traces; the locations of the wide traces are recorded in the wide trace result table, and 1's are entered in the wide trace grid bit map. When beginning to route the narrow traces, 1's are entered in the points on the narrow trace grid that are occupied by wide traces (such as HD in the diagram; wide trace HD is equivalent to two parallel grids in the narrow trace grid).

The partial results table shown in the figure records the narrow traces. The "4" in the table indicates that the four records following it represent the same line; obviously, the first and fourth records are the starting point and end point of this line, while the second and third are the coordinate position of the "borrowed holes" for this trace. These four records completely determine the position of this trace.

Once this trace is laid out, we enter 1's in the positions in the vertical trace section of the narrow trace grid bit map; we similarly enter 1's in the locations representing the positions of horizontal trace sections in the bit map for the horizontal traces; these are barriers to the traces laid down subsequently. When wide and narrow traces connect (as at point D in the figure)

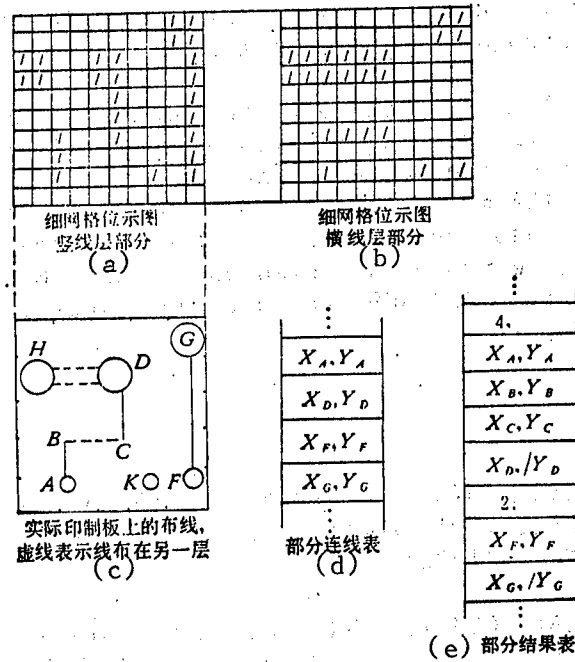


Figure 2. Bit Maps, Tables, and Board

Key:

- Section of thin-wire grid for layer containing vertical interconnections
- Section of thin-wire grid map for horizontal traces
- Interconnections on actual board; dotted lines indicate that interconnection is on other layer
- Part of interconnection table
- Part of results table

or when narrow traces are connected to large solder pads (as at point G), a special try must be made. In this case a 1 is placed in the highest-order bit of record Y of the coordinate records in the results table.

When this system was applied, it succeeded in completing more than 98 percent of the interconnections; the routing results were excellent. When a bit representation of points on the PC board and a flow data structure were used when laying out a 175 x 156 mm board, the space occupied by all of the system's tables and maps was constant and about 6,000 locations sufficed to hold them regardless of the number of holes and lines. When the number of connections was increased to 300-400, the average layout time was 2 to 3 minutes.

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CSO: 4008/301

APPLIED SCIENCES

CONTROLLED FUSION RESEARCH FACILITY OPERATING 'SMOOTHLY'

Beijing KEXUE SHIYAN [SCIENTIFIC EXPERIMENT] in Chinese No 2, 10 Feb 85 inside back cover

[Photographs and captions]

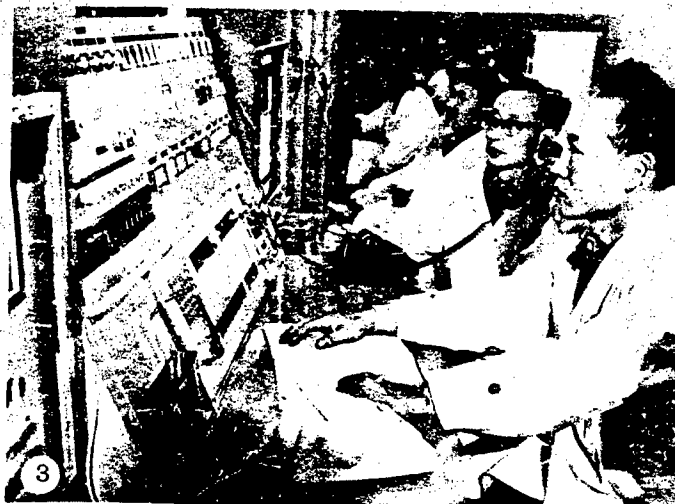
[Text] China's largest controlled fusion research facility has been completed and is operating smoothly.



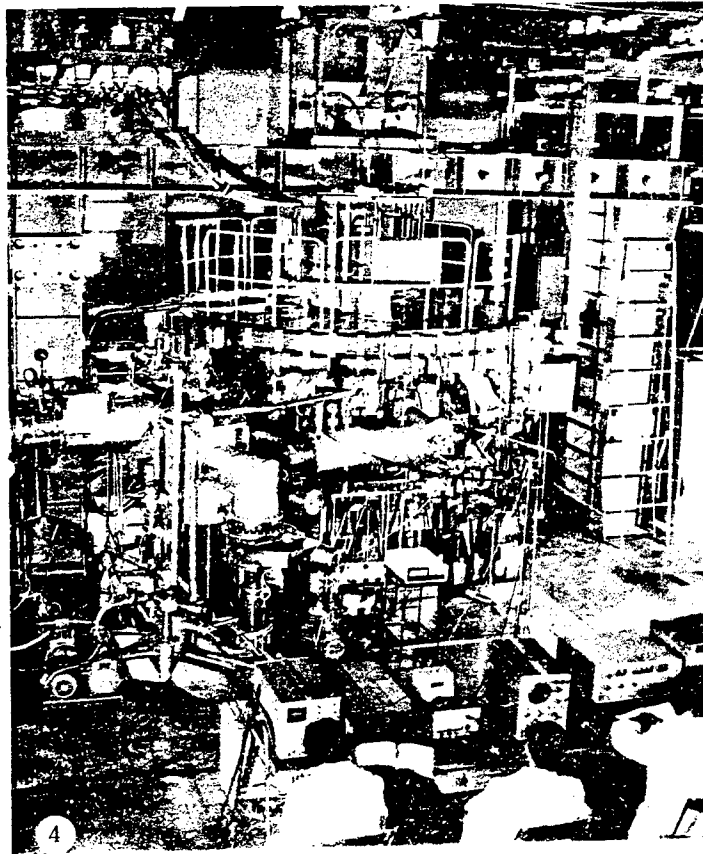
Shown are scientific and technical personnel of the Southwest Physics Institute (Ministry of Nuclear Industry) conducting adjustment experiments on "China HL-1" from the central control room.



Shown second from right is Zhou Ping, vice minister of the Ministry of Nuclear Industry and reactor pile engineering expert along with Li Zhengwu, honorary director of the Southwest Physics Institute and research fellow (fourth from right), Lin Xingyan, director of the institute and senior engineer (extreme left), Qian Shangjie, deputy director and assistant research fellow (third from right), and the developer of "HL-1," senior engineer He Chengxun (extreme right). They are analyzing the magnetic field around the "HL-1."



The control room of the "China HL-1."



Shown is the main facility of the "China HL-1." Technicians are conducting on-the-spot adjustment experiments.

CSO: 4008/403

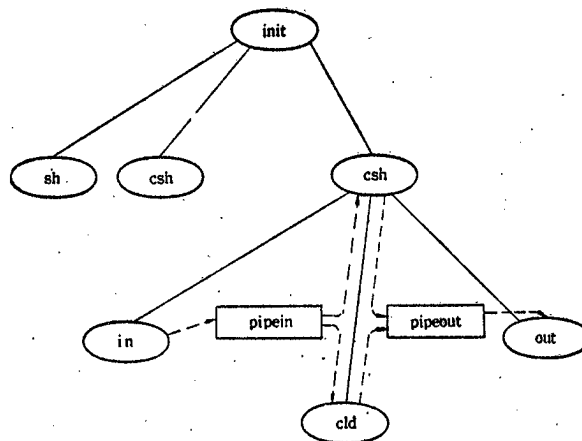
UNIX-BASED PROCESSING TECHNIQUE FOR CHINESE CHARACTERS DESCRIBED

Beijing JISUANJI XUEBAO [CHINESE JOURNAL OF COMPUTERS] in Chinese Vol 8, No 1,
Jan 85 pp 79-80

[Article by Lei Tianmo [7191 1131 2875], Li Xiaoming [2621 1420 2494] and Lu Zhixing [4151 2535 2502], Guangdong Province Computer Center: "A UNIX Chinese Character Processing Technique"]

[Text] Chinese-character input and output [I/O] is a major aspect of Chinese-character processing. It involves Chinese-character coding schemes, Chinese-character internal code selection, Chinese-character I/O equipment, and I/O implementation methods (i.e. Chinese-character I/O technology). In implementation, these aspects are both interrelated and independent. Here we describe a Chinese-character I/O technique implemented in the UNIX operating system. It has already been used on a 16-bit MC86000-based microcomputer and has received a technical evaluation [1]. The system can be used on all computers equipped with the UNIX operating system.

Existing character systems in China mostly modify the operating system's I/O module in order to implement Chinese-character I/O. A major problem of which this approach is that it is difficult to do and may easily affect compatibility with the original system. The technique described here involves adding a Chinese character shell or "Chinese character commander interpretation routine" in the outer layers of the operating system to provide Chinese-character I/O. Because it is in the outer layers of the operating system, no major changes are made in the kernel, so that compatibility with UNIX is maintained and the technique is extremely simple to implement (see figure).



UNIX is a very successful time-sharing system. UNIX Version 7 can support 50 programs. In addition it provides various means of communication between processes such as PIPE, INPUT and the like. The multiple processes supported by UNIX are process families with downward branching trees. The ancestor process is at the top vertex and several descendent processes below it; each descendent process gives rise to more descendent processes [2]. In these process families, each subroutine has its own function, and various communication methods carry out the Chinese-character processing task in coordinated fashion.

The basic concept of this technique is as follows. The initialization process INIT sets up the ancestor process for Chinese-character shell CSH; CSH has the same status in the system as other shells, such as SH, CSH [as published] and the like, established by INIT (Figure 1). CSH also generates an input process IN and an output process OUT and establishes the input pipe PIPEIN and the output pipe PIPEOUT between CSH, IN and OUT. The task of IN is to read from the keyboard and to convert the external Chinese character code that it obtains from the keyboard into an internal Chinese-character code. The IN process places the Chinese-character machine code and other keyboard inputs in PIPEIN. CSH takes the output of IN from PIPEIN, from which it also receives keyboard commands from the operator. CSH checks and interprets the keyboard commands and executes them by generating a new process CLD, which also receives keyboard inputs from PIPEIN. The outputs of CSH and CLD are placed in PIPEOUT. The output subroutine OUT processes the data in PIPEOUT. For example, it converts the Chinese-character internal code into a Chinese-character dot matrix which it forwards to a display or printer driver routine. When CLD has finished it notifies CSH, which resumes reading keyboard commands from PIPEIN and generating new CLD's to execute them, proceeding in a continuous cycle. The IN process is keyboard interrupt-driven. When PIPEOUT is empty, OUT hangs up, but any input to PIPEOUT reactivates it. Thus the addition of CSH, IN, and OUT produces the same result as modifying the operating system's I/O program. In contrast to such a modification of the I/O module, this technique also includes unlocking of the input and output PIPE processes. Because the pipes are in internal storage, these overheads are small. Because the added CSH, like the original SH, is in the outer layers of the UNIX system, it causes no change in the UNIX core and preserves compatibility with UNIX.

This technique is added on to the UNIX multiprogramming and process communication tools and does not involve the I/O equipment or driver programs; thus it is a universally-applicable Chinese-character processing technique within UNIX. The Chinese-character shell CSH, as well as IN and OUT, are written in C language, which increases their portability.

CSH, IN and OUT are three independent entities. When running, they are stored as three separate processes in the system program key. In the design process they were written as three separate programs. Because of this characteristic, this I/O technique is even more loosely connected to other aspects of Chinese-character I/O such as the Chinese-character coding scheme, Chinese-character internal code selection, and Chinese character I/O equipment. The technique

is easily adapted to various coding schemes or various internal codes and all I/O devices and can easily be made to process any other types of characters. Our system is a multilanguage system and currently can process various alphabets.

Implementing this technique in UNIX requires solution of other problems, such as sharing of the Chinese-character dictionary and vocabulary by several Chinese-character users' IN and OUT processes. Multiple programs supported by UNIX cannot share data areas. Changing this characteristic would affect compatibility. Our method is to change the UNIX paragraph and page virtual address management program. We separated out from the UNIX virtual address space a dictionary and vocabulary which were not controlled by the virtual address mapping structure and functioned solely for storage and readout of Chinese characters; thus multiple users' multiple processes can share this space. The UNIX virtual address store management technique in a minicomputer with Multibus structure can manage 16-Mbyte address space (if the backup bus lines are not used) and separate off several hundred Kbyte without affecting system capabilities and characteristics, which also makes it unnecessary to alter hardware in order to establish a Chinese-character vocabulary and dictionary.

Because the PIPE file and the like are unique features of UNIX and other time-sharing systems that support multiprogramming lack this characteristic, the technique described here is not usable in other time-sharing systems.

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CSO: 4008/301

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JPRS-CST-85-028
27 August 1985

ORG: Both of Beijing Institute of Aeronautics and Astronautics

TITLE: "Determination of Three-Dimensional Air Flow Temperature Field by Holographic Interferometry"

SOURCE: Shanghai YINGYONG JIGUANG [APPLIED LASER] in Chinese Vol 5, No 2, Apr 85 pp 54-58

ABSTRACT: The reconstruction of a three-dimensional field applied to holographic interferometry is studied. The methods of reconstruction and parametric effects are analyzed using computer simulations. Aided by high-quality phase grating (made by the authors) and an optical path layout, the continual wide viewing-angle holographic interferograms of three-dimensional hot air flow temperature field are successfully recorded; the temperature field is reconstructed and calculated quantitatively, thus interpreting the interference streaks at different angles. From the calculation results, deviations are greater for some points at the field boundary; this is mainly because the message is still insufficient with a 60° viewing angle for reconstruction of the three-dimensional field. Generally, errors are due to methodological errors, limitations by experimental conditions, and sensitivity in variation of refractive index owing to gas temperature. Thus, slight deviations in the reconstruction of the refractive-index field can directly affect the distribution of temperature field. One table lists relative errors in viewing-angle ranges. Seven figures show a Radon transform, network method, simulation calculation results, angle intervals of sampling, experimental optical path, and holographic interferograms of a hot-air natural-convection temperature field. The paper was received for publication on 6 November 1984.

10424
CSO: 4009/253

JPRS-CST-85-028
27 August 1985

AUTHOR: SHI Tianyuan [0670 3944 0337]

ORG: None

TITLE: "A New Radar Range Data Recursion Filter"

SOURCE: Beijing TUHANG XUEBAO [JOURNAL OF THE CHINESE SOCIETY OF ASTRO-
NAUTICS] in Chinese No 2, 30 Apr 85 pp 13-32

TEXT OF ENGLISH ABSTRACT: A great many papers about recursion filters of least square estimation have been published, but the results of those papers can only be used for noncouple radar measuring systems. The radar range recursion filter formula, which is widely used in present radars, has not been formed yet for linear frequency modulated pulse compression signals. In this paper, the general formula for a radar range data recursion filter is presented which is derived according to the recursion filter transfer smoothing matrix concept. It can be used for all radar or sonar measuring systems.

In addition, the characteristic of α - β - γ tracker filter of the linear frequency modulated pulse compression radar range data is analyzed and the accuracy of the least square recursion filter theory is verified by an artificial method. The results have proved that this theory has many advantages, such as higher reliability and stability, and can restrain itself faster than that described by Fitzgerald. This is a new and useful optimal estimation recursion filter.

AUTHOR: YE Yunshang [0673 0061 5951]

ORG: None

TITLE: "A Calculation for the Contoured Footprints of the Shaped Beam Antenna of Chinese Broadcast Satellites"

SOURCE: Beijing TUHANG XUEBAO [JOURNAL OF THE CHINESE SOCIETY OF ASTRO-NAUTICS] in Chinese No 2, 30 Apr 85 pp 33-44

TEXT OF ENGLISH ABSTRACT: The beam-compensated design is used in this paper. The ideal beam-zones covering Chinese territory by geostationary broadcast satellites have been evaluated. The relationships between the attitude control errors of a three-axis stabilization satellite and its beam-pointing errors are discussed, and then the expanded ideal beam-zone is offered which takes into consideration attitude control errors.

By means of the vector radiation integral and the Jacobi-Bessel Series developing method, the calculation of radiation of the shaped beam by a parabolic reflector with multifeeds is discussed. A set of computer programs evaluating the contoured footprints on earth has been set up and some numerical results are given.

AUTHOR: LI Wenjie [2621 2429 2638]

ORG: None

TITLE: "Computer-aided Shaped Beam Optimization for Communication Satellites"

SOURCE: Beijing TUHANG XUEBAO [JOURNAL OF THE CHINESE SOCIETY OF ASTRO-NAUTICS] in Chinese No 2, 30 Apr 85 pp 67-77

TEXT OF ENGLISH ABSTRACT: This paper describes a method in which a shaped communication satellite antenna beam is generated. All mathematical formulas required for the method derived here and elsewhere are presented. As an example, a shaped beam for a Chinese satellite is calculated. The final results are a group of the optimum feed coefficients for the component beam and a plot with the -3dB and -5dB gain contours on a satcentric map. The -3dB contour circles the territory of China (not including the South Sea) satisfactorily with a gain of 27dB.

AUTHOR: JIANG Yuxian [1203 3768 2009]
LI Xingshan [2621 5887 0810]
WU Mingyu [0702 2494 3768]
et al.

ORG: None

TITLE: "A Study of Active Vehicle Structure Vibration and Decoupling with Control System as well as Initiative Suppression"

SOURCE: Beijing TUHANG XUEBAO [JOURNAL OF THE CHINESE SOCIETY OF ASTRO-NAUTICS] in Chinese No 2, 30 Apr 85 pp 78-89

TEXT OF ENGLISH ABSTRACT: In this paper a phenomenon in which the vehicle structure vibration couples with the control system of the vehicle so that the vehicle structure vibration is not stable, and several methods for removing this hidden danger are presented. Attention is paid to the introduction of methods removing the phenomenon mainly with an active filter. The possibility of active structure vibration suppression using the original control system is discussed.

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ORG: None

TITLE: "Discussion of Characteristics and Mounting Position of the Accumulator"

SOURCE: Beijing TUHANG XUEBAO [JOURNAL OF THE CHINESE SOCIETY OF ASTRO-NAUTICS] in Chinese No 2, 30 Apr 85 pp 98-106

TEXT OF ENGLISH ABSTRACT: In order to suppress the longitudinal coupled oscillations of the launch vehicle, the accumulator is generally mounted in front of the pump inlet. A description of its characteristics and where it can best be mounted are problems that must be studied. This paper discusses the optimum position of the accumulator, its action of conversion frequency, steady pressure and steady frequency, as well as the approximate formula of natural frequency of the fluid system.

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CSO: 4009/267

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ZHU Yifei [2612 6654 7378]
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ORG: University of Science and Technology of China

TITLE: "Preliminary Study of Heterogeneous Catalyst Design"

SOURCE: Hangzhou HANGZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF HANGZHOU UNIVERSITY (NATURAL SCIENCES EDITION)] in Chinese Vol 12, No 2, Apr 85 pp 227-235

TEXT OF ENGLISH ABSTRACT:

Catalyst design is a new field of catalyst science which offers a rapid and efficient way of new catalyst preparation. This paper presents a description of the background and the importance of the development of catalyst design and a detailed introduction to the present status of catalyst design, and the theoretical principles and a new procedure for catalyst design are also given.

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b. 小方芳郎, 工业化学杂志, **67**(1964), 1542—1545.
c. 伊东正朝, 有机合成协会志, **4**(1967), 329—337.
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12949

CSO: 4009/1083

Chemical Engineering

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TITLE: "Effect of Some Impurities Contained in Butadiene on the Synthesis of Medium-Vinyl Polybutadiene Rubber"

SOURCE: Lanzhou HECHENG XIANGJIAO GONGYE [SYNTHETIC RUBBER INDUSTRY] in Chinese Vol 7 No 3, May 85 pp 173-177

ABSTRACT: The effect of acetonitrile, acetone, acrolein, methylethylketone, isobutanol and furan contained as impurities in butadiene on the conversion of butadiene and the microstructure and intrinsic viscosity of the medium-vinyl polybutadiene were investigated in a polymerization system with η -butyllithium (η -BuLi) as initiator, tetrahydrofuran (THF) and diglycol-dimethylether (2G) as additives and cyclohexane as solvent. It was found that these impurities had neither effect on the conversion of butadiene, nor effect on the microstructure (in 2G additive system) and the intrinsic viscosity of the polymer, and the maximum allowable impurity contents in the system were changing with the dosage of η -BuLi. (Received on 14 January 1985)

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2. Liu Huiming, et al., HECHENG XIANGJIAO GONGYE [SYNTHETIC RUBBER INDUSTRY], Vol 7 No 1, 1984 p 29.

CSO: 4009/1073

Chemical Engineering

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TITLE: "Curable Polyurethane Composition Applicable to the Repair of Damaged Elastomeric Cable Sheath in Mining Applications"

SOURCE: Lanzhou HECHENG XIANGJIAO GONGYE [SYNTHETIC RUBBER INDUSTRY] in Chinese Vol 7 No 3, May 85 pp 188-192

ABSTRACT: A two-component curable polyurethane composition, which is specially suitable for the repair of damaged elastomeric cable sheath in mining applications, has been developed. Initially the composition is a liquid having sufficiently low viscosity and suitable to be poured in an adaptable mold around the section of damaged cable, or it can be coated on the damaged cable sheath after pre-thickening. The composition is capable of curing in a relatively short time without heating. After curing, the composition exhibits outstanding adhesion strength (>10 kg/2.5 cm), and excellent electrical and physical properties comparable to the sheath material itself. (Received 23 June 1984)

CSO: 4009/1073

Chemistry

AUTHOR: XIA Shijun [1115 1709 0689]
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TITLE: "Potential Control over Precipitation of Silver"

SOURCE: Hangzhou HANGZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF HANGZHOU UNIVERSITY (NATURAL SCIENCES EDITION)] in Chinese Vol 11, No 3 Jul 84 pp 342-348

TEXT OF ENGLISH ABSTRACT: Potential control over precipitation of silver from $\text{Ag}(\text{NH}_3)_2^+$ solution reduced by hydrazine N_2H_4 is presented. The influence of pH value, the concentration of ammonia NH_3 , the temperature and the existence of some impurities (e. g. Cu, Fe, Pb, etc.) on the rate of the reaction have been investigated. The optimum condition for the system of molar ratio $\text{Cl}:\text{NH}_3:\text{Ag}^+=3.3:15:1$ occurs at 50°C and the initial acidity of the solution is $\text{pH}=12.2$.

Hydrazine is gradually added to $\text{Ag}(\text{NH}_3)_2^+$ solution. As soon as the potential drops to -250mV (vs SCE), stop adding hydrazine and quickly quench the reaction, 99.5% of Ag is reduced, 99.8% Ag is obtained from the initial solution in which Ag is about 88.3% of the total metal ions.

12949
CSO: 4009/1028

Chemistry

AUTHOR: ZHANG Renhao [1728 0088 3185]
et al.

ORG: Harbin Normal University, Department of Chemistry

TITLE: "Studied on Extraction Chemistry of Gold (III)-Extraction of Gold (III) by
Quaternary Ammonium Salt-Kerosene System"

SOURCE: Hangzhou HANGZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF HANG-
ZHOU UNIVERSITY (NATURAL SCIENCES EDITION)] in Chinese Vol 11, No 3 Jul
84 pp 331-336

TEXT OF ENGLISH ABSTRACT: The extraction of gold (III) from hydrochloric acid so-
lution by quaternary ammonium salt (N_{444}) in kerosene has been studied under various
conditions. The composition of the extracted species is made by the methods of
extraction isotherms, mole ratio, equilibrium-shift, continuous variation and absorp-
tion spectra. The results suggest that the extract is the ion-pair $R_4CH_3N^+AuCl_4^-$.
The method has been successfully applied to separation and concentration of gold
from material solution.

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CSO: 4009/1028

Chemistry

AUTHOR: ZHANG Renhao [1728 0088 3180]
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TITLE: "Studies on Extraction Chemistry of Gold (III)-Extraction of Gold (III) from Hydrochloric Acid Solution with Di-iso-octylsulphide in Kerosene"

SOURCE: Hangzhou HANGZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF HANGZHOU UNIVERSITY (NATURAL SCIENCES EDITION)] in Chinese Vol 11, No 3 Jul 84 pp 337-341

TEXT OF ENGLISH ABSTRACT: The extraction behavior of gold from hydrochloric acid solution with di-iso-octylsulphide (DIOS) in kerosene is examined. It is concluded from the experimental data that the monosolvate $\text{AuCl}_2\cdot\text{DIOS}$ is extracted. The extraction of gold is more efficient than that of base metals from hydrochloric acid concentration at 1.0 M. The data obtained from the results of experiments might be supplied as reference or to the practical application.

12949
CSO: 4009/1028

AUTHOR: LI Jifu [2621 7162 4395]
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ORG: Institute of Atomic Energy, Academia Sinica

TITLE: "Silver Halide/Silver Powder Solid Chloride or Bromide Ion-Selective Electrode"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 13, No 1, 20 Jan 85 pp 60-62

TEXT OF ENGLISH ABSTRACT: Three shapes of chloride and bromide ion-selective electrodes using high-purity silver powder as an active material has been developed with good reproducibility and quick response. The response ranges for chloride and bromide of the electrodes are 1×10^0 - 5×10^{-5} M and 1×10^{-1} - 3×10^{-6} M respectively. Their inner resistance is low (about 1 ohm) and a remote measurement is permitted to carry out. The miniaturized electrode may be used for determining the sample solution of small volume of 20 μ l. (Paper received on 17 Oct 83)

12949
CSO: 4009/1052

AUTHOR: WANG Shuhai [3769 2579 3189]

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TITLE: "Determination of Methylmercury in Sediment By Gas Chromatography with Concentration of Rotational Sulfhydryl Cotton Yarn"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 13, No 1, 20 Jan 85 pp 58-60

TEXT OF ENGLISH ABSTRACT: A new method for concentration of methylmercury in sediment by the rotational sulfhydryl cotton yarn is suggested. Samples need not to be separated beforehand. Determining sensitivity of the gas chromatography is raised through establishment of two concentration steps. It is applicable to the determination of environmental background contents of methylmercury in sediment of natural waters. (Paper received on 12 Oct 83)

12949

CSO: 4009/1052

AUTHOR: XU Hongding [6079 1347 7844]
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TITLE: "Determination of Trace Mercury in Sediment By Chronopotentiometry"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 13, No 4,
20 Apr 85 pp 250-254

TEXT OF ENGLISH ABSTRACT: Mercury (II) was determined by the following procedure, the trace mercury was first deposited on the surface of glassy carbon electrode at -0.95 V (vs SCE) during the preelectrolysis in a base solution containing 1M HCl, 1M KSCN and 3×10^{-5} M CdCl_2 , and then stripped out with a constant current (1 μA). There was a linear relationship between the transition time and the concentration of the mercury in the range of 0.01 to 14 ppm. The HgO and HgS in sediment were extracted into 1.25M HCl and 1.25M aquaregia respectively. The method has succeeded in analyzing sediment samples taken from the second Songhua River with a relative standard deviation of 2.7 percent for samples containing parts per million of mercury. (Paper received on 6 Apr 84)

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12949

CSO: 4009/1080

Chemistry

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HU Zhide [5170 0037 1795]

ORG: Department of Chemistry, Lanzhou University

TITLE: "Rapid Separation of Selenium and Tellurium with TBP-containing Resin"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 13, No 4,
20 Apr 85 pp 278-280

TEXT OF ENGLISH ABSTRACT:

A method is described for the rapid separation of Se and Te by TBP-containing resin. With TBP-containing resin as the stationary phase and suitable concentration of HCl and NaCl solution as the mobile phase, complete separation of Se and Te can be obtained within 8 minutes. This method has been applied to the separation and determination of Se and Te in anode mud and wastewater. (Paper received on 6 Sep 84)

References

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12949

CSO: 4009/1080

Chemistry

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TITLE: "Gas Chromatographic Determination of Beryllium and Chromium on Capillary Columns"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 13, No 4, 20 Apr 85 pp 258-262

TEXT OF ENGLISH ABSTRACT: This report presents an analytical method for the determination of micro amounts of beryllium and chromium by capillary gas chromatography. The results showed that the chromatographic peaks were sharp and suitable for peak-height quantitative analyses. Beryllium and chromium from natural water samples such as river water, marine water, sewage water and mineral water were analyzed. Taking 10 milliliters of water sample, the limit of detection was 0.1 μg per liter of Be or Cr. Owing to the high column efficiency of capillary column, beryllium in environmental samples of complex matrices could be separated and determined. The results of Be measured from river sediment and fly-coal ash samples were in good agreement with those obtained by other methods. (Paper received on 24 Apr 84)

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12949

CSO: 4009/1080

Chemistry

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TITLE: "Dual-wavelength Spectrophotometric Determination of Platinum and Rhodium"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 13, No 4, 20 Apr 85 pp 280-282

TEXT OF ENGLISH ABSTRACT: The determination of platinum and rhodium can be directly performed by finding out an equivalent absorbing wavelength of coexistent component parts and measuring their absorbance difference at this point without preseparation and shield of accompanying composition in a sample. The maximum deviation for platinum is less than 0.5 percent. (Paper received on 24 Oct 83)

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12949

CSO: 4009/1080

Chemistry

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TITLE: "Spectrophotometric Determination of Total Rare Earth Elements in Iron and Aluminium-base Alloys with a New Reagent Chlorophosphonazo-m-CF₃"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 13, No 4, 20 Apr 85 pp 289-292

TEXT OF ENGLISH ABSTRACT:

The colour reaction of chlorophosphonazo-m-CF₃ (CPAmCF₃) with rare earths has been investigated. The reagent and the complex of cerium have absorption maxima at 544 nm in 0.5M HCl (pH 6) and at 670nm in 0.1M HCl respectively. The ratio of cerium to CPAmCF₃ is 1:1 or 1:2. The apparent molar absorptivity is $7.95 \times 10^4 \text{ l} \cdot \text{mol}^{-1} \cdot \text{cm}^{-1}$ for the complex. Beer's law is obeyed in the range of 0 to 12μg/10ml of both Ce alone and in a mixture of La, Ce, Pr and Nd (3:5:1:1), and both calibration curves coincide in slope essentially. Using oxalic acid as masking agent, the method has been applied to the determination of total rare earths in iron and aluminium-base alloys by single- and dual-wavelength spectrophotometry with satisfactory results.

(Paper received on 30 Jan 84)

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12949

CSO: 4009/1080

Chemistry

AUTHOR: LI Lingying [2621 3781 4481]
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TITLE: "A Study of the Highly Sensitive Micelle Color Reactions of Metal Ions with Michler's Thioketone and Nonionic Surfactant I. System of Pd (II)-MTK-TRITON X-100"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 13, No 4, 20 Apr 85 pp 283-289

TEXT OF ENGLISH ABSTRACT:

A new sensitive spectrophotometric method of determining microamounts of palladium (II) with Michler's thioketone (MTK) in the presence of Triton X-100 is established. The formation conditions and the reaction mechanism of Pd(II) -MTK-Triton X-100 are also studied. The colour reaction has high sensitivity ($\epsilon_{530} = 1.68 \times 10^5 \text{ l} \cdot \text{mol}^{-1} \cdot \text{cm}^{-1}$) and good selectivity. At pH 3.30 the red complex has maximum absorption at 530nm. The ratio of Pd (II) to MTK in the complex has been found to be 1:4. Beer's law is obeyed in the concentration range of 0 to 10 $\mu\text{g}/25\text{ml}$. This method can be applied to the spectrophotometric determination of microamounts of Pd in various catalyst samples with coefficients of variation not greater than 4 %. (Paper received on 26 Dec 83)

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12949

CSO: 4009/1080

Chemistry

AUTHOR: LIU Renqing [0491 0086 7230]
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TITLE: "Catalytic-kinetic Determination of Palladium and Investigation on Mechanism"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 13, No 4, 20 Apr 85 pp 241-245

TEXT OF ENGLISH ABSTRACT:

The catalytic phosphomolybdic-formic acid reaction was used by Thompson for the determination of sum of platinum and palladium, and some gold salt was introduced to increase the sensitivity. In the present paper the author suggested introducing some mercuric chloride instead of gold salt for the phosphomolybdic acid-hypophosphite reaction. The sensitivity of the determination of palladium increased by about two numerical orders. A linear relation was found between the absorbance and the concentration of palladium in the range from 0.001 to 0.01 $\mu\text{g/ml}$, and the limit of detection was 0.0005 $\mu\text{g/ml}$. The mechanism of catalysis was investigated. It seems plausible that the function of mercury is entirely different from that of gold. (Paper received on 17 Feb 84)

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12949

CSO: 4009/1080

Chemistry

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TITLE: "A Study on Artificial Intelligence Interpretation of Organic Mass Spectra: A Computer Program for the Interpretation of Mass Spectra of Alkylbenzenes and Its Applications"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 13, No 4, 20 Apr 85 pp 245-250

TEXT OF ENGLISH ABSTRACT: This program (DCP-MS) with COBOL is based on rules of mass spectral fragmentation and rearrangement. It has been tested with more than 50 mass spectra of alkylbenzenes. The percentage of the first correct solution is 96 percent and it has been used to interpret mass spectra of some real samples. (Paper received on 5 Mar 84)

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CSO: 4009/1080

27 August 1985

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TITLE: "Spectrophotometric Study of the Color Reaction of Multicomponent Complex of Titanium (IV) with Nitrilotriacetic Acid, 4, 5-Dibromophenylfluorone and Cetyltrimethylammonium Bromide"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 12 No 9, Sep 84 pp 819-823

TEXT OF ENGLISH ABSTRACT: A color reaction of titanium with nitrilotriacetic acid (NTA), 4, 5-dibromophenylfluorone (Br-PF) and CTMAB has been studied spectrophotometrically. It is shown that titanium can form a quaternary complex with the above reagents at pH 2.5-4.0 and NTA can enter into the inner sphere of the complex of Ti(IV) together with Br-PF. The complex is stable for at least 12 hrs. The apparent molar absorptivity of the complex is 2.13×10^5 at 576 nm, and the composition ratio of Ti(IV)/NTA/Br-PF/CTMAB is 1:1:2:2. Beer's law is obeyed for titanium (IV) in the range of 0-4 $\mu\text{g}/10 \text{ ml}$. The quaternary complex has better analytical characteristics than does the ternary complex. The possible structure of the complex is suggested. A simple and highly selective method has been successfully applied to the determination of titanium in alloy steels without separating Ti from its accompanying elements.

AUTHOR: ZHANG Huali [1728 5478 7787]
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ORG: Beijing General Research Institute of Nonferrous Metals

TITLE: "Spectrophotometric Investigation of the Complex Formation of Niobium with Bromopyrogallol Red (BPR), Cetylpyridinium Bromide (CPB) and Emulsifier Polyethyleneglycol Octylphenylester"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 12 No 9, Sep 84 pp 824-828

TEXT OF ENGLISH ABSTRACT: Niobium (V) forms an intense blue complex with BPR in the presence of cationic-CPB and non-ionic-emulsifier OP surfactant. The complex is stable over the pH range of 6.5 to 7.0, with maximum absorption at the wavelength of 635 nm. The molar ratio of Nb/BPR/(CPB)op has been found to be 1:4:8. Lambert Beer's law is obeyed in the concentration range of 0 to 22 μg for Nb(V) in 50 ml and the apparent molar absorptivity is $1.41 \times 10^5 \text{ l} \cdot \text{mol}^{-1} \cdot \text{cm}^{-1}$. In the presence of EDTA the interference of 31 cations and 7 anions was examined. Some tentative suggestions regarding the structure of the complex and the mechanism of the complexation are also discussed.

AUTHOR: ZHENG Yongxi [6774 3938 3556]
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TITLE: "Studies of the Micellar Solubilization Spectrophotometric Determination of Micro Amounts of Beryllium with Eriochrome Azurol B-Variou Hydrocarbon Chain Cations-Anionic Mixed Surfactants as Sensitizers"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 12 No 9, Sep 84 pp 828-832

TEXT OF ENGLISH ABSTRACT: A simple, rapid and highly sensitive spectrophotometric method for determining Be(II) has been developed based on a detailed study of the color reaction of Be(II) with ECAB in the presence of various mole ratios of mixed cation-anionic surfactants (hexyl trimethyl ammonium bromide, C_6NBr , and sodium dodecyl sulphate, $NaC_{12}S$).

The system obeys Beer's law in the range of 0.002 to 0.088 μg Be/ml. The apparent molar absorptivity is 1.33×10^5 at $\lambda_{max}=628$ nm. This method proves satisfactory for the determination of Be in the alloys.

The mechanism of the reaction between Be^{2+} and ECAB in the presence of the mixed surfactants has been studied spectrophotometrically. The results show that there is a very high surface activity of the mixed surfactants when the mole ratio of C_6NBr to $NaC_{12}S$ approaches 6:1, the surface tension is very low--down to 28 dyne/cm, and the maximum absorption is obtained at the critical micellar concentration. The formation of micelle appears to play an important role in the sensitized effect.

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ZHOU Dai [0719 3782]
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TITLE: "Indirect Determination of Micro Amounts of Arsenic by Cold Atomic Fluorescence Method"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 12 No 9, Sep 84 pp 839-841

TEXT OF ENGLISH ABSTRACT: A new method is proposed for the indirect determination of micro amounts of arsenic using the cold atomic fluorescence technique. This method has a higher sensitivity ($0.002 \mu\text{g As}$) and a better reproducibility. The procedure is simple and no toxic reagent is required. It has been applied successfully for the determination of micro amounts of arsenic in sludges and in catalysts of hydrogenation with satisfactory results. The coefficient of variation is 8.5 percent.

AUTHOR: LIU Xunhua [0419 8113 5478]
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ORG: Central Laboratory, Nei Monggol Metallurgical and Geological
Exploration Company

TITLE: "Determination of Platinum and Palladium in Minerals and Rocks with
Dual Wavelength Spectrophotometric Method"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 12 No 9,
Sep 84 pp 842-844

TEXT OF ENGLISH ABSTRACT: The interference occurred in the determination of
platinum and palladium with a n, n'-didodecyldithio-oxamide as the sole color-
forming reagent due to the presentation of mixed colors. The elimination of
the interference was studied by using a spectrophotometer with the dual-
wavelength method. A simple procedure for simultaneous determination of Pt
and Pd was developed. Both the selectivity and accuracy were improved.

AUTHOR: LIU Fang [0419 5364]
ZHOU Huaizhong [0719 2037 1813]

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TITLE: "A New Type of Sample Introduction Device for ICP Light Source Powder"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 12 No 9, Sep 84 pp 844-846

TEXT OF ENGLISH ABSTRACT: On the basis of the sample introduction device of the Central Laboratory, Yunnan Geological Bureau, we have developed a new type of ICP continuous arc-broken closed sample introduction device characterized by homogeneity in introducing powder samples, stability in operation, arc-continuity, high efficiency in photographing and good protection and safety. This device can be used to analyze the elements Yb, Y, La, Ce, etc., in rare earth ore samples. Its relative errors are in the range of 4 to 19 percent.

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TITLE: "Determination of Phosphonofluoridates with Ag_2S Selective Electrode"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 12 No 9,
Sep 84 pp 846-848

TEXT OF ENGLISH ABSTRACT: Based on the reaction in which phosphonofluoridates react with iso-nitrosoacetyl aniline to produce cyanide ions, the phosphonofluoridates can be determined by a silver sulfide selective electrode in the presence of potassium silver cyanide. The electrode potential obeys the Nernstian equation when the concentration of phosphonofluoridate lies within 10^{-6}M to 10^{-4}M . The limit of detection is $5 \times 10^{-7}\text{M}$.

AUTHOR: SONG Wenzhong [1345 2429 0112]
JIN Yan [6855 1484]

ORG: Changchun Institute of Applied Chemistry, Chinese Academy of Sciences

TITLE: "Determination of Rare Earth Impurities in Pure Terbium Oxide Using Emission Spectrochemical Analysis"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 12 No 9, Sep 84 pp 852-855

TEXT OF ENGLISH ABSTRACT: A highly sensitive, accurate and simple emission spectrochemical method for the simultaneous determination of Sm, Gd, Dy, Ho, Er and Y in Tb_7O_{11} is developed. A solution of higher concentration was used for increasing the absolute quantity of detected samples on the carbon electrodes. The samples were excited by an AC arc in a mixture of oxygen and argon. In the routine analysis of highly pure Tb_7O_{11} , satisfactory results have been obtained.

AUTHOR: DUAN Fusen [3008 4395 2773]
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ORG: Xi'an Laboratory, Shaanxi Geological Bureau

TITLE: "Cathode-ray Polarographic Determination of Micro Amounts of Cadmium in Geological Samples"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 12 No 9, Sep 84 pp 855-856

TEXT OF ENGLISH ABSTRACT: An electroactive complex of cadmium was formed with tetrabutylammonium iodide and potassium iodide in an acidic medium. The complex can be easily adsorbed on the surface of a mercurial electrode, and gives rise to a sharp peak at the potential--0.77 V (vs silver electrode). The most suitable supporting electrolyte is composed of 0.2 N hydrochloric acid, 0.32 percent ascorbic acid, 0.08 percent tetrabutylammonium iodide, and 2 percent potassium iodide. The detection limit of 0.0016 $\mu\text{g/ml}$ for cadmium is satisfactory for the determination of geological samples.

AUTHOR: WANG Xiulin [3769 0208 2651]

ORG: Changsha Semiconductor Technology and Equipment Research Institute

TITLE: "Spectrophotometric Study of the Ion-Association Reaction of Phosphozirconomolybdate Blue with Crystal Violet and the Determination of Phosphorus in Steels"

SOURCE: Changchun FENXI HUAXUE [ANALYTICAL CHEMISTRY] in Chinese Vol 12 No 9, Sep 84 pp 857-859

TEXT OF ENGLISH ABSTRACT: The spectrophotometric determination of trace phosphorus has been studied successfully with phosphozirconomolybdate blue and crystal violet in a solution of ascorbic acid- Na_2SO_3 - $\text{Na}_2\text{S}_2\text{O}_3$ and polyvinyl alcohol. The desirable acidity is 0.04 N H_2SO_4 . The association complex exhibits maximum absorption at 550 nm, with molar absorptivity being 1.3×10^5 . Beer's law is obeyed in the range of 0 to 6.8 μg in 25 ml. The phosphozirconomolybdate blue/crystal violet ratio is 1:2.

9717

CSO: 4009/1035

AUTHOR: CHEN Xiexiong [7115 0253 7160]
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ORG: None

TITLE: "On Two Techniques for Expanding the Logic Synthesis Capability of PLA"

SOURCE: Hangzhou HANGZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF HANGZHOU UNIVERSITY (NATURAL SCIENCES EDITION)] in Chinese Vol 12, No 2, Apr 85 pp 205-215

TEXT OF ENGLISH ABSTRACT:

In this paper two techniques for overcoming the fixed-capacity limit of a PLA are proposed. One of them is an algorithm for reducing the number of product terms of a function when the PLA with two-bit decoders is used. Another is the use of the logic function modification technique⁽¹⁾ into the synthesis with PLA.

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12949

CSO: 4009/1083

Electronics

AUTHORS: XIONG Guangyu [3574 0342 3558]
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TITLE: "Gyrator Circuit Analysis"

SOURCE: Taiyuan TAIYUAN GONGYE DAXUE [JOURNAL OF TAIYUAN UNIVERSITY OF TECHNOLOGY] in Chinese No 4, Dec 84 pp 83-94

ABSTRACT: By analyzing the performance of a gyrator circuit, a valid method is provided in this paper. Furthermore, some important practical problems about gyrator circuit design and applications such as gyrator frequencies, stability properties, simulated inductance and its sensitivities are discussed. The method is applicable for other operational-amplifier gyrator circuits, which proves itself useful to design and application. (Paper received on 30 May 1984).

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CSO: 4009/1082

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JPRS-CST-85-028
27 August 1985

ORG: East China Institute of Chemical Technology

TITLE: "Chemical Strengthening of $\text{Na}_2\text{O}-\text{Al}_2\text{O}_3-\text{SiO}_2$ System Glasses by Surface Controlled Crystallization"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE SILICATE SOCIETY] in Chinese
Vol 13 No 1, Mar 85 pp 29-37

TEXT OF ENGLISH ABSTRACT: The effects of ion-exchange treatment technology, especially salt baths of different compositions in the binary system $\text{Li}_2\text{SO}_4-\text{Na}_2\text{SO}_4$ and the ternary system $\text{Li}_2\text{SO}_4-\text{Na}_2\text{SO}_4-\text{K}_2\text{SO}_4$, on the rupture modulus of unabraded and abraded samples are systematically presented. The concentration-distance profile is determined by electron microprobe and the photoelastic method and, at the same time, the diffusion coefficient of the $\text{Li}^+ \rightleftharpoons \text{Na}^+$ ion is calculated. It is demonstrated that the growth of different crystal faces of β -eucryptite strongly depends on the salt bath composition, treatment temperature, etc. The correlation between nucleation and growth of β -eucryptite, and the structure of base glass is discussed based on the data obtained in X-ray diffraction and infrared absorption or reflectance spectra.

AUTHOR: LIU Xiaoming [0491 1420 2494]
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ORG: Beijing Glass Research Institute

TITLE: "Optical Absorption of Ion Doped Silica Glass Prepared by Gel Process"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE SILICATE SOCIETY] in Chinese
Vol 13 No 1, Mar 85 pp 52-57

TEXT OF ENGLISH ABSTRACT: Silica glasses, uniformly doped with seven kinds of transition metal ions from V to Cu, etc., were prepared by the gel process at low temperatures. The coordination and valency state of each kind of ion in the silica glass were deduced according to the optical absorption spectra of the ions and the color of the glasses, and these values were compared with those of doped silica glasses obtained by other techniques. Some factors affecting the spectra absorption of the glasses were discussed. The maximum allowable doping concentration of each kind of ion used to obtain transparent and vitreous materials was also determined.

AUTHOR: XIAO Shaozhan [5135 4801 1455]

ORG: Beijing Glass Research Institute

TITLE: "A Reaction Series Model for the Structure of $\text{Na}_2\text{O}-\text{B}_2\text{O}_3-\text{SiO}_2$ Glasses"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE SILICATE SOCIETY] in Chinese
Vol 13 No 1, Mar 85 pp 58-66

TEXT OF ENGLISH ABSTRACT: Based on the latest data from B^{11} NMR studies in the current literature, a new structural model, the "reaction series model," which consists of a series of reactions, is suggested. According to such a simplified model, an experimental rule is pertinently explained in which three kinds of curves which are plots of the relative fractions of the tetrahedra, symmetric and asymmetric triangles versus the glass composition all have their own peak or valley characteristics.

AUTHOR: ZHANG Qingchun [1728 3237 4783]
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ORG: Shanghai Institute of Ceramics, Chinese Academy of Sciences

TITLE: "Relationship Between Mechanical Properties and Microstructure of MoSi_2 Heating Element"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE SILICATE SOCIETY] in Chinese
Vol 13 No 1, Mar 85 pp 84-91

TEXT OF ENGLISH ABSTRACT: The relationship between mechanical properties and the microstructure of the MoSi_2 heating element was investigated. Using the optimum binder in preparation, the mechanical properties of the MoSi_2 materials have been improved, resulting in densification of the microstructures. The MoSi_2 materials fracture mainly in an intercrystalline manner. However, because of the structural weakening of grains by the dispersion of SiO_2 due to oxidation of MoSi_2 , transcrystalline fracture in part can be found. The transcrystalline fracture is also observed at some recrystallized grains in oversintered specimens. This can lead to a significant degradation of mechanical properties.

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ORG: Tianjin Synthetic Diamond Factory, China Nuclear Energy Industry Corporation

TITLE: "Impurities and Inclusions in Synthetic Diamonds"

SOURCE: Beijing GUISUANYAN XUEBAO [JOURNAL OF THE SILICATE SOCIETY] in Chinese Vol 13 No 1, Mar 85 pp 105-110

TEXT OF ENGLISH ABSTRACT: The impurities and inclusions in synthetic diamonds, grown with catalyst $\text{Ni}_{70}\text{Mn}_{25}\text{Co}_5$, have been determined and analyzed by the following methods in this study: spectral semiquantitative analysis, atomic absorption spectral analysis, chemical analysis, scanning electron microscope analysis, X-ray diffraction analysis, and differential thermal analysis, etc. The results obtained are as follows: Amounts of the elements Be, P, Pb, U, Ga, Sn, V, Zr, Ag, Y, Sr, Ba, Bi, Sb, Cd, W and In in diamonds are under the detection limits of spectral analysis. Various atoms dissolved in the melting catalyst can be bound with carbon atoms on the surface of the growing diamond. Al and Si seem to incorporate with diamond more easily than do Ni and Co when the growth rate of the crystal is low. Ni and Co are more easily incorporated with diamond when the growth rate of the crystal is high (for example, when the linear growth rate is $1\mu\text{m/s}$) and a large quantity of mother solution is included. The chemical compositions of different inclusions may be different. When Al and Si are more, Ni and Co will be less; when Ni and Co are more, Al and Si will be less. The atoms of impurities usually segregate along the plane {110} to form inclusions. The distances between the planes of the inclusions preliminarily determined are 2.126\AA , 1.84\AA , 1.80\AA and 1.044\AA . When the ferromagnetism of the diamond is relatively strong, its startind oxidation temperature decreases, twin peaks appear in the differential thermal curve and the compressive strength of the diamond is reduced as well.

AUTHOR: LIU Chaoxin [0491 2600 0207]
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ORG: Institute of Physics, Chinese Academy of Sciences

TITLE: "Stable Phase Region and Crystal Growth in GdIG in Flux PbO-B₂O₃"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE SILICATE SOCIETY] in Chinese
Vol 13 No 1, Mar 85 pp 124-126

TEXT OF ENGLISH ABSTRACT: The phase regions of the PbO-B₂O₃-Gd₂O₃-nFe₂O₃ system at temperatures ranging from 1250-950°C were investigated. A stable composition region of the GdIG phase was determined. The saturation temperature of the high temperature solution with the following composition was measured: 7.50 Gd₂O₃, 22.50 Fe₂O₃, 58.33 PbO, 11.67 B₂O₃ (mole 1 percent). A thermal process for the growth of GdIG crystals is suggested.

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HUANG Dequn [7806 1795 5028]
WANG Haobing [3769 3185 3521]

ORG: Shanghai Institute of Optics and Fine Mechanics, Chinese Academy of Sciences

TITLE: "Electron Microprobe Analysis of Inclusions in $\text{Cr}^{3+}:\text{BeAl}_2\text{O}_4$ Crystals"

SOURCE: Beijing GUI SUANYAN XUEBAO [JOURNAL OF THE SILICATE SOCIETY] in Chinese
Vol 13 No 1, Mar 85 pp 127-128

TEXT OF ENGLISH ABSTRACT: Morphologies of inclusions in $\text{Cr}^{3+}:\text{BeAl}_2\text{O}_4$ crystals have been observed. The chemical composition of the inclusions has been determined by electron microprobe. The inclusions formed are due to the impurities in raw material BeO.

9717
CSO: 4009/1037

JPRS-CST-85-028
27 August 1985

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TITLE: "Optical Nutation Echoes in Infrared Region"

SOURCE: Shanghai YINGYONG JIGUANG [APPLIED LASER] in Chinese Vol 5, No 2,
Apr 85 pp 49-53, 92

ABSTRACT: The paper reports on experimental evidence of optical nutation echoes allowing a partial reconstruction of macroscopic polarization in the infrared region. Optical nutation echoes must be carefully distinguished from the usual photon echoes related to free induction decay. The experiments were performed by Stark switching; applications in molecular spectroscopy are discussed. Satisfactory experimental results agree quite closely with theoretical calculations by the author and his colleagues (derived from the Bloch equation) in WULI XUEBAO [PHYSICS JOURNAL], 34, No 3, 359 (1985). Five figures show a vector model of the Bloch equation in a rotation coordinate system, a vector model generating optical nutation echoes, the Stark switching method, the structure of the Stark absorption tank, and the relationship between oscillation amplitude and time of optical nutation echoes in the infrared region. The experiments were conducted on the Berkeley campus of the University of California. The author thanks Professor E. L. Hahn for his support and assistance, and to Dr J. Kash for his assistance in computer software. The paper was received for publication on 13 December 1984.

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TITLE: "Laser Effect on Quartz Surfaces"

SOURCE: Shanghai YINGYONG JIGUANG [APPLIED LASER] in Chinese Vol 5, No 2,
Apr 85 pp 59-62

ABSTRACT: An intense laser effect on a quartz crystal and quartz glass is studied with a pulsed TEA CO₂ laser. Operating by generating several to scores of optical pulses, TEA CO₂ laser can impress a periodic surface structure on a quartz crystal and quartz glass. The characteristics of this periodic structure depend on the wavelength, polarization and angle of the incident laser beam. The cause for this phenomenon appears to be interference by surface electromagnetic waves, but not related to the crystallization condition, geometric dimensions and the cut orientation of the quartz. Six figures show the periodic structure on the quartz surface by laser pulses, the relationship between wavelength of incident light (and incident angle) and the period of surface structure, interference between scattered light and incident light, comparison between calculation results and an experiment with surface electromagnetic waves, and experimental observations of surface

electromagnetic waves. The study was completed at the Max-Planck Institute of Solid-State Physics in West Germany. The author thanks Dr F. Keilmann for his assistance. The paper was received for publication on 2 November 1984.

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TITLE: "Study of Pumping Performance of the Simmer-Enhanced Flashlamp-Pumped Dye Laser"

SOURCE: Shanghai YINGYONG JIGUANG [APPLIED LASER] in Chinese Vol 5, No 2, Apr 85 pp 63-66, 74

ABSTRACT: As is well known, a dye laser should be pumped with a short-pulse light source with very fast rise time. In this paper a simple, reliable simmer-enhanced circuit of the flashlamp system was described. In order to improve the pumping properties of a flashlamp-pumped dye laser, the authors have more widely approached and experimentally investigated simmer-enhanced technology that is newly developing. The optimal conditions for operation was suggested. Nine figures show typical volt-ampere performance curves of a pulsed xenon lamp, the circuitry principle of an enhanced preionization technique proposed for the first time by T. K. Yee, et al., a circuitry principle developed by authors, the cutoff process of controllable silicon, a waveform diagram, operating principle of a flashlamp with an enhanced preionization circuit described by the waveform diagram, output performance curves, current-versus-input energy relationship, and relationship between delay time and related output energy. The paper was received for publication on 24 October 1984.

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TITLE: "Temperature Dependence of Absorption of Atmospheric C_2H_4 for a CO_2 Laser"

SOURCE: Shanghai YINGYONG JIGUANG [APPLIED LASER] in Chinese Vol 5, No 2,
Apr 85 pp 67-69

ABSTRACT: In 1979, China developed a CO_2 laser-monitoring system for atmospheric pollution by the use of grating modulation. The system can measure the average pollution concentration at a certain distance. The measurement principle is based on absorption of CO_2 laser radiation by the polluting gases at room temperature. However, the absorption coefficient of gases varies with temperature; therefore, necessary modifications should be made to convert to polluting gas concentrations at temperatures different from the room temperature. The temperature-dependent relationship of atmospheric ethylene in its absorption coefficient to CO_2 laser radiation is required. The temperature effect of the absorption coefficients of ethylene (C_2H_4) for 949.480 cm^{-1} was measured by using a CO_2 laser. The results showed that the absorption coefficients of ethylene decreased from $32.03\text{ atm}^{-1}\text{ cm}^{-1}$ to $28.47\text{ atm}^{-1}\text{ cm}^{-1}$ with a rise in temperature from 20°C to 50°C ; this agrees closely with the theoretical calculations. Two figures show the experimental set-up and absorption coefficients of ethylene as a function of temperature. The paper was received for publication on 15 January 1985.

10424

CSO: 4009/253

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ORG: Institute of Mechanics, Academia Sinica

TITLE: "Effect of Plasma Density and Velocity Distribution of Tokamak on Kelvin-Helmholtz Instability"

SOURCE: Beijing LIXUE XUEBAO [ACTA MECHANICA SINICA] in Chinese Vol 17, No 3, 1985 pp 220-228

TEXT OF ENGLISH ABSTRACT:

The purpose of this paper is to study the effect of radial variation of plasma density and toroidal velocity on Kelvin-Helmholtz instability in Tokamak. In this case the toroid is regarded as an axisymmetric, infinite straight cylinder which is divided into two regions. In central region I there is incompressible, ideal plasma, its density ρ_0 and toroidal velocity V_0 distribute along the radius, whereas the density ρ_1 and toroidal velocity V_1 in the surrounding annulus-region II which is full of incompressible non-conductive ideal gas are constant. It is found that the Kelvin-Helmholtz instability couldn't be caused by the only velocity distribution, on the contrary, when $\rho_0 = \rho_0 e^{-t^2}$, and $V_0 = \text{const}$, the instability will increase proportionally to the value of t . Meanwhile when the value of t remains constant, the growth rate of instability will decrease if the ρ_0 grows. It shows that the Kelvin-Helmholtz instability is not only influenced by the steepness of density distribution, but also by the inertia of plasma in region I, which is helpful for depressing the instability. The calculated results can be used to explain the fact that the confinement of plasma became worse during the counter neutral beam injection.

12949

CSO: 4009/264

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TITLE: "Wake Structure Behind Tandem Circular Cylinders When the Downstream Cylinder Oscillates"

SOURCE: Beijing LIXUE XUEBAO [ACTA MECHANICA SINICA] in Chinese Vol 17, No 3, 1985 pp 272-277

TEXT OF ENGLISH ABSTRACT:

Wake structure behind two circular cylinders in tandem arrangement was investigated experimentally by means of a hot-wire anemometer and flow visualization techniques at Reynolds numbers ranging from 10^3 to 10^5 . The spacings between the axes of the two cylinders were varied in the range $1.5 \leq s/d \leq 10$. In the first place, the vortex shedding frequencies behind the tandem circular cylinders were measured at low Reynolds numbers and various spacings between two cylinders. The mechanism of the discontinuous phenomenon of the vortex shedding frequencies was explained by studying the flow patterns. Next, when the downstream cylinder was forced to vibrate sinusoidally at frequencies near that of the natural shedding for two stationary cylinders, the vortex shedding was locked in frequency. Flow visualization revealed that there were peculiar flow patterns-secondary vortices, the elongation and contraction of the vortex streets at the two limits of the locked regions.

12949

CSO: 4009/264

Mechanics

AUTHOR: LI Guobing [2621 0948 3521]

ORG: Taiyuan Technical University

TITLE: "MHD Equilibrium of the θ -Pinch with Reverse Trapped Magnetic Field"

SOURCE: Beijing LIXUE XUEBAO [ACTA MECHANICA SINICA] in Chinese Vol 17, No 3, 1985 pp 229-236

TEXT OF ENGLISH ABSTRACT:

An analytical expression for the plasma free boundary has been obtained by means of conformal mapping. Several cross sections of the plasma have been given as examples. This article shows that equilibrium may exist only when the flux of reverse trapped field is less than $1/8$ of that of the main field, and the plasma width is less than $1/2$ of the radius of the discharge coil.

12949

CSO: 4009/264

Mechanics

AUTHOR: GUAN Chuquan [4619 2806 0356]

ORG: Institute of Mathematics, Academia Sinica

TITLE: "The Fitting of Shocks in Steady Plane Potential Flows"

SOURCE: Beijing LIXUE XUEBAO [ACTA MECHANICA SINICA] in Chinese Vol 17, No 3, 1985 pp 282-286

TEXT OF ENGLISH ABSTRACT:

In this paper, we shall show that, for steady plane potential flow, for speeds close to $q^* = \sqrt{q_{cr} q_{max}}$ there is a simple area rule, which determines the position of the shock wave and hence enables the physically realistic solution to be deduced from the multi-valued solution of the general boundary value problem, which requires both sets of characteristics for a complete description.

12949

CSO: 4009/264

Mechanics

AUTHOR: WANG Zhenming [3769 7201 7686]
MEI Hai [2734 3189]

ORG: Institute of Mechanics, Academia Sinica

TITLE: "The Calculation Method of Bearing Capacity of Stiffened Plates and Shells of Metal and Composite Materials"

SOURCE: Beijing LIXUE XUEBAO [ACTA MECHANICA SINICA] in Chinese Vol 17, No 3, 1985 pp 253-258

TEXT OF ENGLISH ABSTRACT:

In this paper, the problem of the effective stiffness of the face sheet of stiffened cylindrical panels made of metal or composite materials with initial imperfections is investigated in the pre- and post-buckling range. An approximate method is put forward to calculate the bearing capacity of stiffened plates and cylindrical panels under the action of external load after the local buckling of the face sheet has occurred or when the local buckling of the face sheet is nearly equal to the overall buckling of the stiffened panel.

12949
CSO: 4009/264

Medicine

AUTHOR: XU Maoli [1776 2021 7787]
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ORG: Shanghai Institute of Pharmaceutical Industry

TITLE: "Chemotherapeutic Studies on Schistosomiasis XXXVI. Synthesis of Derivatives of 4-phenyl-and 4-allyl-5-(pyrazinyl-2)-1, 2, 4-triazole-3-thio-ketone"

SOURCE: Beijing YAOXUE XUEBAO [ACTA PHARMACEUTICA SINICA] in Chinese No 2, 85 pp 100-104

TEXT OF ENGLISH ABSTRACT: Twenty-eight new derivatives of 4-phenyl-and 4-allyl-5-(pyrazinyl-2)-1, 2, 4-triazole-3-thio-ketone (II and III) were synthesized. The key intermediates 4-phenyl-and 4-allyl-substituted 1-(pyrazinyl-2) formyl-thiosemicarbazide were obtained from ethyl-(pyrazinyl-2)-carboxylate by hydrazinolysis and reaction subsequently with phenyl or allyl isothiocyanate. They were cyclized in the presence of 2N sodium hydroxide to form II and III, followed by alkylation, acylation and Mannich reaction under various suitable conditions to afford the corresponding compounds.

After preliminary screening two compounds (III₁, III₂) were found to have pronounced effect on liver shift of *Schistosoma japonica* in experimental mice.

Key words Schistosomicide; 4-phenyl-5-(pyrazinyl-2)-1, 2, 4-triazole-3-thio-ketone; 4-allyl-5-(pyrazinyl-2)-1,2,4-triazole-3-thio-ketone

12949
CSO: 4009/234

Medicine

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ORG: Shanghai Institute of Materia Medica, Academia Sinica

TITLE: "Studies on Analogues of Qinghaosu (Arteannuin, Artemisinin) III. The Synthesis of Diacidesters and Mono Esters of Dihydroqinghaosu"

SOURCE: Beijing YAOXUE XUEBAO [ACTA PHARMACEUTICA SINICA] in Chinese No 2, 85 pp 105-111

TEXT OF ENGLISH ABSTRACT: A series of diesters and monoesters of dihydroqinghaosu was prepared and evaluated for their antimalarial activities.

These compounds were synthesized by acylation, in some cases, 4-(N, N-dimethyl-amino)-pyridine (DMAP) was used as acylating catalyst.

Most of these compounds were more active than qinghaosu against chloroquine-resistant strain of plasmodium berghei in mice.

Compound 3 was found to be 9 times as active as qinghaosu. Besides, it seems that the antimalarial activities of diesters were independent of the ester chain lengths.

Key words Antimalarials; Chloroquine-resistant strain of plasmodium berghei; Diacid esters and mono esters of dihydroqinghaosu; Diacid esters of dihydro-ino deoxyqinghaosu.

12949
CSO: 4009/234

Metallurgy

AUTHOR: HUANG Xiaoying [7806 1321 3841]

ORG: Central Iron and Steel Research Institute, Ministry of Metallurgical Industry, Beijing

TITLE: "Direct Observation on Dislocation and Stacking Fault Configuration of Ni-Base Alloy Containing 6.5% Al"

SOURCE: Beijing JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 21, No 1, Feb 85, pp A34-A 39

TEXT OF ENGLISH ABSTRACT: An electron diffraction contrast observation on the dislocation and stacking fault structure and their movement behaviour in Ni-base alloy containing 6.5% Al was carried out by means of TEM. The experimental results show as:

1. Solution heat treatment processes with different quenching rates influence significantly upon the defect configuration. Under high quenching speed, a lot of macroholes with characteristic morphology have been observed and analyzed crystallographically.
2. After solution heat treatment specimens suffered a certain extent of deformation pile-ups were observed frequently. There is a critical value of deformation to induce pile-ups in this alloy. Based on the experimental facts, a new concept about pile up dislocation density was suggested, which may be useful to describe the relationship between strength and microstructure of the alloy.
3. Some interstition reactions of pile-ups have been analyzed and discussed. An in-situ observation of movement of extensive dislocations and the morphology of leading partials was made by successive photograph technique in TEM. It shows even if dislocations on the same slip plane and under the same thermal stress condition, they may be derived in quite different degrees, some of them extend into two partials, the other does not.
4. The moving dislocation presented various appearances, a "bow-in" like or a "bow-out" like curve, which does not always coincide with the moving direction of dislocations. This can be explained in consideration of complex stress state associated with them.

12949

CSO: 4009/240

Metallurgy

AUTHOR: ZHANG Shunnan [1728 7311 0589]
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ORG: Institute of Metal Research, Academia Sinica, Shenyang

TITLE: "The Influence of Boron on Porosity of Cast Ni-Base Superalloys"

SOURCE: Beijing JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese, Vol 21,
No 1, Feb 85, pp A 1-A 8

TEXT OF ENGLISH ABSTRACT: The influence of B content on the solidification and on the porosity formation of cast Ni-base superalloys has been examined. Because of the solubility of B in γ -solid solution is quite limited, the B may be enriched in melt at the front of frozen solid during solidification. For superalloys containing more B, say 0.1%, the solidified grain may be surrounded by a much low melting point liquid coating enriched with extreme B as high as 1%. It was found under metallographic observation that their microstructure reveals as the interconnected continuous "web-like filling channels" which expand the temperature range in molten state and reduce the residual amount of liquid unable to fill the pores. Thus, an improvement of the cast superalloys over both porosity elimination and technological allowance has been noticed. The liquid pools in alloys are small and isolated, and the microporosities are finely distributed. For superalloys of normal B content, say about 0.01%, the B did not be enriched to such extent that the liquid web was not yet formed. The solidified dendritic grains may be interconnected rather promptly along certain fastly growing directions, and the residual liquids isolated each other into large pools. In this case, the unsolidified liquid pools may be up to 30% in volume of the alloys. Therefore, the more serious porosities will be resulted.

12949

CSD: 4009/240

Metallurgy

AUTHOR: HE Jinrui [0149 2516 3843]

ORG: Beijing Institute of Aeronautical Materials

TITLE: "Strain Energy Partitioning and Its Application to GH33A Ni-Base Superalloy and 1Cr18Ni9Ti Stainless Steel"

SOURCE: Beijing JINSHU XUEBAO [ACTA METALLURGICA SINICA] in Chinese Vol 21, No 1, Feb 85, pp A54-A63

TEXT OF ENGLISH ABSTRACT: The energy partitioning (SEP) approach, namely, a modification of strain-range partitioning (SRP), has been developed to predict the creep fatigue crack initiation life for GH33A Ni-base superalloy at 700°C and 1Cr-18Ni9Ti stainless steel at 600°C. It shows that the life can be predicted by two variables: the maximum tensile stress and the partitioned inelastic strain-range, i.e., the strain-range component in SRP is substituted by the strain energy component in SEP. The low-cycle fatigue data at elevated temperature for these two given alloys are correlated and predicted to within a factor of 2 using SEP, while some numerals of data for GH33A beyond the factor of 2 using SRP. In addition, the predicability of SEP versus SRP has been evaluated by 8 other alloys of high-strength and low-ductility. It would seem that SEP is an improvement over SRP.

12949

CSO: 4009/240

Nuclear Physics

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ORG: Baoding Teacher-training College and Institute of Atomic Energy, Academia Sinica

TITLE: "Theory of Transmission of Particle Beam in a Disalignmental Optical System with Compelling Force"

SOURCE: Beijing YUANZINE WULI [CHINESE JOURNAL OF NUCLEAR PHYSICS] in Chinese
Vol 7, No 1, Feb 85, pp 69-76

TEXT OF ENGLISH ABSTRACT: The transport characteristics of particle beam congregation in the disalignmental phase space are given. The equations of phase point trajectory and the matrix of envelope are derived. The effects of disalignments of optical components on phase trajectory and envelope are discussed.

Key words Compelling force, Particle beam transmission.

12949
CSO: 4009/244

Nuclear Physics

AUTHOR: CAO Liming [2580 7787 2494]

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TITLE: "A Study of the Traveling Wave Beam Position Measurement for Electron Linac"

SOURCE: Beijing YUANZIHE WULI [CHINESE JOURNAL OF NUCLEAR PHYSICS] in Chinese
Vol 7, No 1, Feb 85, pp 77-83

TEXT OF ENGLISH ABSTRACT: Based on the principle of the time interval phase measurement, a fast non-interceptive beam position monitor is described. The transverse beam position of electron Linac for both of continuous wave and pulsing operations can be detected by using two kinds of experimental microwave networks and the accuracy of detecting beam displacements is better than 0.1mm.

Key words Beam diagnosis, Transverse position, Phase time method.

12949

CSO: 4009/244

Nuclear Physics

AUTHOR: FU Shinian [0265 0013 1628]
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ORG: Institute of Atomic Energy, Academia Sinica

TITLE: "Transport of Six-Dimensional Centrosymmetric Beam Phase Space through Linear"

SOURCE: Beijing YUANZIHE WULI [CHINESE JOURNAL OF NUCLEAR PHYSICS] in Chinese
Vol 7, No 1, Feb 85, pp 84-92

TEXT OF ENGLISH ABSTRACT: The transport theory of the beam phase space defined by 6-dimensional centrosymmetric smooth convex close curve surface $f(x_1, x_2, \dots, x_6; a, b, \dots)=0$ is proposed. A fundamental theorem is derived to describe the beam envelope of such beam phase space through linear field. Detailed calculation is worked out for typical example to show the application of the theory.

Key words 6-dimensional centrosymmetric smooth convex close curve surface, Sub-space.

12949
CSD: 4009/244

Nuclear Physics

AUTHOR: ZHU Shengyun [2612 0581 0061]
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ORG: Institute of Atomic Energy, Academia Sinica

TITLE: "Neutron Radiative Capture Cross Section of ^{193}Ir at 565keV"

SOURCE: Beijing YUANZIHE WULI [CHINESE JOURNAL OF NUCLEAR PHYSICS] in Chinese
Vol 7, No 1, Feb 85, pp 93-96

TEXT OF ENGLISH ABSTRACT: The neutron radiative capture cross section of ^{193}Ir relative to $^{191}\text{Ir}(n,\gamma)$ cross section is measured by activation method at 565keV. The measured cross section is $\sigma=180\pm20\text{mb}$. The present result is in good agreement with those of Lindner and ~~Доббелко~~. Based on this, cross section for the reaction $^{193}\text{Ir}(n,\gamma)^{194}\text{Ir}$ are recommended from 0.01 to 3 MeV.

Key words ^{191}Ir , ^{193}Ir , Neutron reaction, Activation method.

12949

CSO: 4009/244

JPRS-CST-85-028

27 August 1985

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ORG: All of Institute of Atomic Energy, Chinese Academy of Sciences

TITLE: "Production of 6 J KrF Laser"

SOURCE: Beijing HE KEXUE YU GONGCHENG [CHINESE JOURNAL OF NUCLEAR SCIENCE AND ENGINEERING] in Chinese Vol 5, No 1, Mar 85 pp 1-5

ABSTRACT: The paper describes a transverse pumping KrF laser with a heavy-current pulse electron beam as developed by the Inertial Confinement Fusion Laboratory of the Atomic Energy Institute; the KrF excimer laser pumped with a relativistic electron beam of high intensity at gas pressures up to 3.5 atm was investigated. The experiment shows that for an Ar: Kr: F₂ = 89.6:10:0.4 mixture, the maximum energy output is about 7.2 J, while 6 J is the rated output. Some KrF lines were observed. By using a plane grating spectrograph, the half-power width of the KrF laser (with central wavelength at 2484 Å) was found to be 5 Å; the fluorescence half-width is 30 Å. The time waveforms of laser pulses and fluorescence pulses were measured with a GD 5 photoelectric tube.

The authors also studied the dynamic process of an electron beam pumping KrF laser; relationships were obtained between laser intensity and electron beam density on the one hand, and the pressure of the gas mixture, on the other. Subsequent studies will include enhancement of laser quality, continual increases in laser energy, interaction between laser and substances, and methods of compressing laser pulse width.

Ten figures show the structure of a cold cathode diode and probe, a KrF laser generation installation and test set-up, KrF laser and fluorescence spectrograms, distribution curves of KrF laser and fluorescence spectra, waveforms of electron-beam voltage and current, and KrF laser and fluorescence waveforms. The paper was received for publication on 3 December 1984.

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HU Chengxiang [5170 2110 7449]

ORG: All of Research and Design Institute No 728

TITLE: "Analysis of Fuel Rod Thermal Behavior for a Pressurized Water Reactor of the Qinshan Nuclear Power Plant"

SOURCE: Beijing HE KEXUE YU GONGCHENG [CHINESE JOURNAL OF NUCLEAR SCIENCE AND ENGINEERING] in Chinese Vol 5, No 1, Mar 85 pp 14-22

ABSTRACT: The 300 MWe pressurized water reactor (PWR) was equipped with 121 fuel rod assemblies, each containing 204 fuel rods, each of which is composed of a zirconium alloy cladding tube and an enriched uranium dioxide core block. The fuel rod thermal-hydraulic characteristics, such as fuel rod temperature, gas conductance, internal pressure, cladding stress and strain (and their variation with fuel consumption), and the minimum DNBR in the reactor core for the 300 MWe PWR Qinshan Nuclear Power Plant are calculated for the first fuel cycle. The effects of some factors are analyzed and the uncertainty in calculation error is given. Seven figures show a program flowchart, time variation curves of parameters of hot fuel rods, internal pressure variation curves of the fuel-rod gap, temperature distribution of the centers of average and hot rods for the entire reactor core, heat storage of fuel rods in the entire reactor core, temperature distribution in the initial life span of the hottest fuel-rod assembly, and the average temperatures of rod center and the core block. Two tables list the thermal parameters of the hottest fuel rod in the first fuel cycle, and the effects of manufacturing allowances of the core block and zirconium cladding tube on thermal parameters. The paper was received for publication on 27 April 1983.

AUTHOR: ZHU Lidong [2612 7787 0392]

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TITLE: "Analysis and Calculation of PWR Upper Plenum Flow Field"

SOURCE: Beijing HE KEXUE YU GONGCHENG [CHINESE JOURNAL OF NUCLEAR SCIENCE AND ENGINEERING] in Chinese Vol 5, No 1, Mar 85 pp 34-39, 33

ABSTRACT: The three-dimensional potential flow theory is applied to analyze the steady flow field of PWR (pressurized water reactor) upper plenum. In the calculations, the definite integral of triangular functions is solved by a Romberg integral and the approximation of the modified Bessel function of the first kind calculated from series expansion.

In accordance with the three-dimensional potential flow theory, the author and his colleagues designed a PFT-1 computer program for the analysis of the

flow field. It is used to analyze the PWR of Qinshan Nuclear Power Plant as an example, and the velocity and pressure distributions of the upper plenum of two loops and four loops are given.

One table shows the geometric parameters of the upper plenum. Six figures show the PWR, upper plenum coordinate system, flow velocity distributions in the upper plenum for two and four loops, pressure difference distribution in the upper plenum for four loops, and comparison of flow velocity distributions for two loops. The paper was received for publication on 17 January 1984.

AUTHOR: PENG Feng [1756 7685]
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ORG: Both of Xinan Institute of Nuclear Reactor Engineering

TITLE: "Pressurized Water Zero Power Reactor Assembly"

SOURCE: Beijing HE KEXUE YU GONGCHENG [CHINESE JOURNAL OF NUCLEAR SCIENCE AND ENGINEERING] in Chinese Vol 5, No 1, Mar 85 pp 68-72, 92

ABSTRACT: A high temperature (270°C) pressurized water zero power reactor assembly is described. Its structure and main design parameters are given: reactor working pressure, 70 kg/cm²; inside diameter of pressure vessel, 70 cm (thickness, 80 mm); and power of heating system, 200 kW. The main parts of the reactor assembly are as follows: pressure vessel, control-rod drive mechanism, high-current heater, cooling system and neutron detection system. This reactor is quite different from the conventional light-water zero-power reactor. The account presented may be useful to the development of small pressurized water reactor power stations in China. A table lists principal parameters of high-temperature zero-power reactors in China, the Soviet Union and the United States. Four figures show a schematic of a high-temperature zero-power reactor, magnetic lifter, cooling system, water supply system, and pressurizing system. The paper was received for publication on 29 June 1983.

AUTHOR: LUO Shanggeng [5012 0006 1649]
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ORG: Both of Institute of Atomic Energy, Chinese Academy of Sciences

TITLE: "Views on the Management of Radwastes From Nuclear Power Stations"

SOURCE: Beijing HE KEXUE YU GONGCHENG [CHINESE JOURNAL OF NUCLEAR SCIENCE AND ENGINEERING] in Chinese Vol 5, No 1, Mar 85 pp 78-82

ABSTRACT: Considerable amounts of radioactive wastes in the forms of gases, liquids and solids are accumulated with the operation of a nuclear power plant. After appropriate treatment and cleaning to an allowable level, these wastes can then be discharged into the environment. The quantity of radioactive wastes is related to many factors of the particular nuclear power plant, such as reactor type, power, design, operation, management level, maintenance, incident situation, and waste treatment technique. In order to satisfactorily manage the radwastes, the four following basic principles should be followed: (1) Strive to reduce the radwastes in all aspects of the power station: design, construction, operation and waste treatment. (2) Strive to develop a volume reduction technique through burning, compaction or crushing. (3) Develop a proper solidification technique by using cement, asphalt or plastics. (4) Realize final disposal which guarantees safety by burial in shallow strata, discarded mine shafts or rock caves. Ocean disposal has been suspended since February 1983 (by the London conference) in the face of more and more oppositions. These points are discussed in this article, which was received for publication on 19 January 1984.

10424

CSO: 4009/252

Physical Chemistry

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TITLE: "Adsorption of Photographic Spectral Sensitizing Dyes and Their Combinations on the Surface of Silver Bromide and Enthalpies of Adsorption Measurements"

SOURCE: Beijing GANGUANG KEXUE YU GUANGHUAXUE [PHOTOGRAPHIC SCIENCE AND PHOTOCHEMISTRY] in Chinese No 2, May 85 pp 1-8

ABSTRACT: The light absorption and adsorption properties of three cyanine dyes I, II and III were studied in solution and in their adsorbed states for each dye alone and for their combinations.

Adsorption isotherms of dyes suspended in AgBr at 25°C and the adsorption (reflection) spectra of dyes in solutions and in adsorbed states were obtained. Very small heat effects (<10 mcal) accompanying dye adsorption were measured with the Versatile Model BD-1 Precision Semiconductor Calorimetric System developed by us using a calorimetric unit specially designed for this adsorption system. The precision temperature control of the thermostat to $25 \pm 0.0001^\circ\text{C}$ was implemented by a microcomputer system. The isosteric molar enthalpy of I adsorption to AgBr in water was obtained to be $-(33.5 \pm 2.5)$ kJ/mol (Surface coverage $\theta = 94\%$). Also from dye combination studies, the obtained spectra, isotherms as well as appreciable heat of adsorption all indicate further adsorption of dye I to AgBr dyed with II and/or III, forming possibly multilayers over the first layer of II and/or III, while no (or very little) adsorption of II and/or III can take place over dye I. This clarifies the fact that in the photographic emulsion production, the green sensitive dyes II and III must be added prior to the adding of I to ensure supersensitization. The results show that enthalpy measurements in combination with spectroscopy may be helpful for studying the sensitizing effect in photographic emulsion production. (Paper was received on 28 June 1983.)

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CSO: 4009/1075

27 August 1985

Physical Chemistry

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TITLE: "The Kinetics of the Growth Process of Zeolite ZSM-5 Crystals"

SOURCE: Taiyuan TAIYUAN GONGYE DAXUE [JOURNAL OF TAIYUAN UNIVERSITY OF TECHNOLOGY] in Chinese No 4, Dec 84 pp 21-30

ABSTRACT: In the hydrothermal system $\text{Na}_2\text{O}-\text{Al}_2\text{O}_3-\text{SiO}_2-\text{H}_2\text{O}$ the forming mechanism of Zeolite ZSM-5 crystals with the method of introducing seed ZSM-5 crystals into gel is studied and the kinetic equation of the growth of Zeolite ZSM-5 crystals is deduced as $\frac{dx}{dt} = 5.25kx^{\frac{2}{3}} x_0^{\frac{1}{3}} a_0^{-1}$.

The rate constant k is $k = \frac{3a_0}{5.25t} \left(\sqrt[3]{\frac{x}{x_0}} - 1 \right)$. The validity of this kinetic equation is proved by varying the quantity of seed crystals and particle size, and the growth process of the crystals is observed by the scan electron microscope. (Paper received on 14 March 1984.)

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CSO: 4009/1082

Physics

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ORG: Shanghai Institute of Mechanical Engineering

TITLE: "A Research in Phase Velocity Method of Plane Wave to Determine the Elastic Constants for Fiber Reinforced Composite Materials"

SOURCE: Shanghai JIXIE XUEYUAN XUEBAO [JOURNAL OF SHANGHAI INSTITUTE OF MECHANICAL ENGINEERING] No 1, 1985 pp 65-73

TEXT OF ENGLISH ABSTRACT: In the present paper, the authors regard fiber reinforced composite materials as macroscopical homogeneous orthotropic body. By means of Christoffel's equation of plane wave, the relationship formulas between the phase velocities of plane wave and the elastic constants are determined. If the phase velocities are measured with the help of the experimental method, the elastic constants can be obtained by the formulas. Based on this principle, the elastic constants are determined with the experimental method for four kinds of materials. There are: steel, GRP laminate, GRP lamina and carbon fiber-epoxy lamina. A comparison is made between the experimental method and the resonance method. Finally the characteristics of the phase velocity method are dealt with briefly and some proposals to improve the experiment are also suggested.

12949
CSO: 4009/254

Physics

AUTHOR: LI Yuan [2621 0954]

ORG: Shanghai Institute of Mechanical Engineering

TITLE: "The Quantum-Well Heterostructure Lasers"

SOURCE: Shanghai JIXIE XUEYUAN XUEBAO [JOURNAL OF SHANGHAI INSTITUTE OF MECHANICAL ENGINEERING] No 1, 1985 pp 91-101

TEXT OF ENGLISH ABSTRACT: The quantum-well heterosstructure (QWH) laser is one of the new type semiconductor lasers developed during the last decade. The main characteristics is the thickness of the source range is so small ($< 500 \text{ \AA}$) that the quantum size effects are exhibited. The linearity of its intensity current characteristics, the stability of the threshold current and noise characteristics dynamical behaviors are better than those of the typical double heterostructure (DH) lasers. In this paper, the main features and properties of QWH lasers are described and studied.

12949

CSO: 4009/254

Physics

AUTHOR: ZHU Lingxin [2612 3781 1800]
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ORG: Shanghai Institute of Technical Physics, Academia Sinica

TITLE: "PbTe Coating Material and Properties of Its Deposition Films"

SOURCE: Shanghai HONGWAI YANJIU [CHINESE JOURNAL OF INFRARED RESEARCH] in
Chinese Vol 4, No 1, Feb 85, pp 1-8

TEXT OF ENGLISH ABSTRACT: The dependence of optical properties of PbTe films on the deposition process and the characteristics of coating material is presented. It is obvious from the experimental results that the stoichiometric proportions and preparing process of PbTe coating material play a very important role in this aspect. In order to obtain an optimum deposition condition a simple method to test PbTe coating material before its deposition is suggested.

12949
CSO: 4009/241

Physics

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TITLE: "Measurement for the Integration MTF_i of the CCPD-1024 Device"

SOURCE: Shanghai HONGWAI YANJIN [CHINESE JOURNAL OF INFRARED RESEARCH] in Chinese Vol 4, No 1, Feb 85, pp 29-33

TEXT OF ENGLISH ABSTRACT: The integration modulation transfer function MTF_i of the CCD array is one of the important parameters for evaluation of the imaging quality of the device. The MTF_i of a CCPD-1024 device with a rate of pushbroom overlapping ξ which tends to infinity is measured by using narrow-seam light-source scanning. The differences between the experimental values and the theoretical ones are larger along the direction of array and smaller in the direction perpendicular to the array. The result of calculated MTF_i values of the CCPD-1024 device in pushbroom mode shows that ξ seems more reasonable when it is chosen as $1 \sim 2$.

12949

CSD: 4009/241

Physics

AUTHOR: CHU Junhao [5969 0689 3185]

ORG: Shanghai Institute of Technical Physics, Academia Sinica

TITLE: "Fermi Level and Burstein-Moss Effect of Degenerate Semiconductor $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$ "

SOURCE: Shanghai HONGWAI YANJIU [CHINESE JOURNAL OF INFRARED RESEARCH] in Chinese Vol 4, No 1, Feb 85, pp 39-45

TEXT OF ENGLISH ABSTRACT: The application of the intrinsic carrier concentration formula in edge generation of the Fermi level with conduction band for narrow gap semiconductor $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$ is discussed. The Fermi level in degenerate semiconductor $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$ is calculated by taking account of the non-parabolic band revision factor for the electron concentration in conduction band.

The intrinsic absorption spectra for $\text{Hg}_{1-x}\text{Cd}_x\text{Te}$ thin samples with $x=0.165$ ($10\mu\text{m}$), $x=0.170$ ($9\mu\text{m}$) and $x=0.194$ ($24\mu\text{m}$) are measured in the temperature region 77-300°K. Burstein-Moss shift is observed obviously. The optical energy gap obtained from the experiment agrees well with the calculated result of the Fermi level.

12949

CSC: 4009/241

Physics

AUTHOR: ZHU Angu [2612 2491 1172]

ORG: Modern Physics Institute, Fudan University

TITLE: "The Vibrational Spectroscopy and the Photoacoustic Spectroscopy of the Surface Adsorbate"

SOURCE: Shanghai HONGWAI YANJIU [CHINESE JOURNAL OF INFRARED RESEARCH] in Chinese Vol 4, No 1, Feb 85, pp 53-64

TEXT OF ENGLISH ABSTRACT: Various experimental measurements used for studying surface phonon and the adsorbate vibrational mode are briefly compared. Among them the recent results obtained from the infrared reflection-absorption spectroscopy are reviewed with emphasis. It may not only be used for the fingerprint of adsorption species, but also respond to the short-range structure (e. g. adsorption site and the tilt angle of the adsorbate, etc.) and the long-range structure (the phase transition of the order-disorder and the commensurate-incommensurate, etc.). Besides, the electronic structure of the adsorbate and surface can be investigated by internal modes and the "frustrated" modes. The information of the intermolecular coupling can be obtained with the high resolution measurement. Physical mechanisms which give rise to the frequency shifts are discussed. The recent achievements of the photoacoustic spectroscopy in the study of surface adsorbate are reviewed as well.

12949

CSO: 4009/241

Physics

AUTHOR: YAN Zhixin [0917 1807 2450]

ORG: Department of Physics, Shanghai University of Science of Technology

TITLE: "Application of B Spline Function in DC Characteristics Simulation of Short Channel MOS Device"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 6, No 2 Mar 85 pp 113-122

TEXT OF ENGLISH ABSTRACT: A new method for DC characteristics simulation of short channel MOS device is presented by B spline function. The mathematical model of three-dimensional 2-order least square B spline functions with special boundary constrain condition for MOS device is derived on the basis of the tensor product theory and pluri-knot technique. And the corresponding SMDC program (Simulation for MOS DC Characteristics) is developed.

The simulation results for DC characteristics of MOS devices with channel length of $8\mu\text{m}$, $5\mu\text{m}$, $3\mu\text{m}$ and $0.39\mu\text{m}$ respectively show that the calculation and measurement for all devices are in good agreement. The average relative error of all the data for each device in the operating regions is only about 2%. The CPU time for calculating one I_{DS} data is 0.1 second on the IBM 370/148 computer.

Compared with MOS analytical models in SPICE (Simulation Program with Integrated Circuit Emphasis), SMDC program demonstrates the distinct superiority for simulating DC characteristics of short channel device, especially for those submicro devices of $L < 1\mu\text{m}$.

12949

CSO: 4009/1025

AUTHOR: ZHANG Aizhen [1728 1947 3791]
WANG Yangyuan [3769 7122 0337]

ORG: Institute of Semiconductor Devices, Beijing and Microelectronics Research Center, Peking University

TITLE: "Study of Oxidation Characteristics of Polycrystalline Silicon Films in Dry-
O₂ Amient"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS], in
Chinese Vol 6, No 2 Mar 85 pp 150-158

TEXT OF ENGLISH ABSTRACT: The oxidation characteristics of both undoped and heavily phosphorus doped poly-Si films deposited by LPCVD have been systematically investigated in the temperature range of 800--1200°C using dry O₂. It has been observed that the rule of oxidation for undoped poly-Si fillms can not be described by Deal-Grove model and that there is a characteristic stage of rapid oxidation for poly-Si when the temperature is below 900°C. In this range, the oxidation rate of undoped poly-Si films is not only faster than (100) Si but also faster than (111) Si, while it is oppostie in the case of heavily phosphorus doped poly-Si films.

The differences of oxidation characteristics between the single and poly-Si, and between undoped and heavily doped poly-Si films disappear completely when the temperature is 1200°C.

The mechanisms for explaining the phenomena are discussed.

12949
CSO: 4009/1025

AUTHOR: CHEN Ziyao [7115 5261 1202]
et al.

ORG: Shanghai Institute of Metallurgy, Academia Sinica

TITLE: "Determination of Al Content Profiles in GaAlAs-GaAs Multilayer Structural Material by Photoelectro-Chemical Method"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 6, No 2 Mar 85 pp 181-184

TEXT OF ENGLISH ABSTRACT: A method for the estimation of Al concentration by photoelectrochemical technique is reported. The results obtained are in good agreement with those of AES. This photoelectrochemical technique combined with the electrochemical C-V method have been used to acquire fuller information on the characteristics of GaAlAs-GaAs structural material, such as the conductivity type, thickness, carrier concentration and Al content profiles. As a result, a new method is suggested for a comprehensive analysis of the physical properties of multicomponent structural semiconductors.

12949

CSD: 4009/1025

Physics

AUTHOR: DAI Daoxuan [2071 6670 1357]
ZHU Furong [2612 4395 2837]

ORG: Institute of Modern Physics, Fudan University

TITLE: "A Study of Oxygen Adsorption of InP (111) by Using CLS, AES and XPS"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in
Chinese Vol 6, No 2 Mar 84 pp 190-194

TEXT OF ENGLISH ABSTRACT: CLS, AES and XPS measurements have been used to study oxygen adsorption onto the ion bombarded and annealed InP(111) surface and the initial stages of oxidation. At low oxygen exposure, it has been observed that oxygen is adsorbed on sites above the In island, oxide of In can be observed at exposure of 10^9 LO_2 , but oxide of P begins to appear at high exposure of 10^8 LO_2 . The mechanism of adsorption and oxidation has been discussed briefly.

12949

CSD: 4009/1025

Physics

AUTHOR: NI Mei [0242 3780]
et al.

ORG: Shanghai Institute of Semiconductor Devices and Fudan University

TITLE: "Study of $^{31}\text{P}^+$ -Implanted Si Layers with Photoacoustic Spectroscopy"

SOURCE: Beijing BANDAOTI XUEBAO [chinese journal of semiconductors] in
Chinese Vol 6, No 2 Mar 85 pp 195-198

TEXT OF ENGLISH ABSTRACT: The effect on P-implanted Si layers with photoacoustic spectroscopy in near infrared wavelength range is reported. The correlation between the amplitude of photoacoustic signal and the implanted dose at levels from 1×10^{12} to $1 \times 10^{15} \text{ cm}^{-2}$ are obtained and the information at implanted dose level as low as $5 \times 10^{11} \text{ cm}^{-2}$ is also effectively detected. The photoacoustic signal increases significantly with the implanted dose at lower levels (1×10^{12} to $5 \times 10^{13} \text{ cm}^{-2}$). Therefore, the photoacoustic spectroscopy is an effective method for studying damaged layers induced by ion implantation. On the other hand, it is considered that photoacoustic techniques have the prospect of becoming a noncontact, rapid and nondestructive method for measuring implanted dose in silicon even at low dose levels

12949

CSO: 4009/1025

Physics

AUTHOR: WANG Zhengxiao [3076 2913 1321]

ORG: Institute of Semiconductors, Academia Sinica

TITLE: "Discussio Concerning the Choice of Optimal Recess Depth of Microwave Recessed-Gate GaAs FET's"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in Chinese Vol 6, No 2 Mar 85 pp 199-202

TEXT OF ENGLISH ABSTRACT: Through the results of 2D numerical analysis using finite element method for recessed-gate GaAs FET's, this paper points out that with the increase of recess depth d_R , the main performance parameters for power and low noise GaAs FET's, i.e. the maximum output power P_{max} and the minimum noise coefficient F_{min} are improved. However, another main parameter for both devices, i.e. the unilateral gain G_u , is decreased. A discussion is given on the problem concerning how to choose the optimal recess depth for power and low noise recessed-gate devices and a deep one is suitable for low noise devices.

12949

CSD: 4009/1025

Physics

AUTHOR: YANG Guangrong [2799 0342 2837]
et al.

ORG: Institute of Semiconductors, Academia Sinica

TITLE: "Silicon Epitaxy on Sapphire under a Lower-Temperature Conduction"

SOURCE: Beijing BANDAOTI XUEBAO [CHINESE JOURNAL OF SEMICONDUCTORS] in
Chinese Vol 6, No 2 Mar 85 pp 203-207

TEXT OF ENGLISH ABSTRACT: The lower-temperature epitaxy of Si on sapphire is realized by partially ionized beam method. The Hall mobility of Si monocrystalline epitaxial film obtained at the substrate temperature of 700°C is about $270^2\text{cm}^2/\text{V.s}$ and its impurity concentration is in the order of $10^{16}-10^{17}/\text{cm}^3$. When the temperature of the substrates is increased up to about 800°C , the mobility of Si epitaxy films reaches about $300\text{cm}^2/\text{V.s}$. It has been proved by the experiments that the energy of partially ionized beam plays an important role in the film epitaxy. The main function of the energies is: (1) to lower the epitaxy temperature; (2) to effect the structure and quality of the epitaxy films; (3) to influence the growing manner of epitaxy in the energy range of about $5\text{KeV}-10\text{KeV}$, i.e. the island growing appears in the lower substrate temperature and the layer growth occurs easily in the case of the higher substrate temperature.

12949

CSO: 4009/1025

Physics

AUTHOR: XING Guangqian [6717 0342 6197]

ORG: Beijing Institute of Control Engineering

TITLE: "A New Approach to Improve The Accuracy of Attitude Determination--A Redundant Measurement Model Method"

SOURCE: Beijing ZIDONGHUA XUEBAO [ACTA AUTOMATICA SINICA] in Chinese Vol 11, No 2, Apr 85, pp 141-151

TEXT OF ENGLISH ABSTRACT: The usual methods for attitude determination of spinning satellite have been mentioned in many papers published abroad. The common disadvantage of these methods is the existence of many singular points at which the determination of attitude accuracy differences is of no practical value. Date and time for the launch of the satellite have to be selected meticulously so as to get better attitude determination results. In order to overcome this disadvantage, the concept of redundant measurement model is presented in this paper. Because of the application of the redundant measurements models for attitude determination, singular point distributions in the usual methods have been improved, the accuracy is higher and the launch window has been expanded.

12949

CSO: 4009/239

Physics

AUTHOR: XING Guangqian [6717 0342 6197]

ORG: Beijing Institute of Control Engineering

TITLE: "Degree of Observability and Accuracy of State Estimate for General Measurement System"

SOURCE: Beijing ZIDONGHUA XUEBAO [ACTA AUTOMATICA SINICA] in Chinese Vol 11, No 2, Apr 85, pp 152-158

TEXT OF ENGLISH ABSTRACT: In this paper the concept of degree of observability in modern control theory is applied to the analysis of attitude determination accuracy. The analytical relationship between accuracy and degree of observability of a measurement system has been found and it is shown that the degree of observability can be used as mathematical features for selecting the best measurement model.

In addition, the results about redundant measurement model have been extended to general measurement system and provide theoretical basis for constructing the best measurement model in practical design.

12949

CSO: 4009/239

Physics

AUTHOR: JIANG Yuxian [1203 3768 2009]
WANG Weini [3769 4850 1441]

ORG: Beijing Institute of Aeronautics

TITLE: "Optimal Quadratic Asymptotic Design Approach and Its Application"

SOURCE: Beijing ZIDONGHUA XUEBAO [ACTA AUTOMATICA SINICA] in Chinese Vol 11,
No 2, Apr 85, pp 159-165

TEXT OF ENGLISH ABSTRACT: In this paper, the determination of weighting matrices by expected eigenvalues and expected eigenvectors in closed-loop systems, and the determination of initial matrix of iterative solutions to the Riccati algebraic equation by the asymptotic optimal regulator behavior are studied. Based on this, an optimal quadratic asymptotic design approach for linear regulators is presented. A program has been developed. Test results show that this method is feasible.

12949

CSO: 4009/239

Physics

AUTHOR: HE Changan [0149 7002 1344]

ORG: Northwestern Polytechnical University

TITLE: "Engineering Practic of Applying LQ Optimal Control and Optimal Observer to Servosystem with Measurable Strong External Disturbance"

SOURCE: Beijing ZIDONGHUA XUEBAO [ACTA AUTOMATICA SINICA] in Chinese Vol 11, No 2, Apr 85, pp 168-174

TEXT OF ENGLISH ABSTRACT: A servosystem with measurable strong external disturbance is designed by LQ optimal theory in this paper. This resultant system has not only an optimal state-variable feedback but also an optimal feedforward compensator and an optimal compensator of disturbance, therefore the performance of the system is appreciably improved. A design method of an optimal observer is also introduced in this paper for the case when the states of the system can be measured directly. As an example, an electric-hydraulic loading system has been introduced to illustrate the design procedure and the results of calculation and experiment.

12949

CSO: 4009/239

AUTHOR: WANG Shaomin [3769 4801 3046]
YU Guoan [0060 0948 1344]

ORG: None

TITLE: "Fundamental Modes of Self-pumped Phase-conjugate Resonators"

SOURCE: Hangzhou HANGZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF HANGZHOU UNIVERSITY (NATURAL SCIENCES EDITION)] in Chinese Vol 12, No 2, Apr 85 pp 190-193

TEXT OF ENGLISH ABSTRACT:

An equivalent transfer matrix describing the operation of self-pumped phase-conjugate mirror is given

$$\begin{pmatrix} a_{11} & b_{11} \\ c_{11} & d_{11} \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ -\frac{2}{\rho_i} - \frac{i\lambda}{\pi W_i^2} & 1 \end{pmatrix},$$

which is similar to (but not identical with) that of Gaussian reflectivity mirror because the radius of curvature and the reflectivity profile are variables and both depend on the incident beam.

By this matrix the fundamental eigenmodes of a resonator with such phase-conjugate mirror are derived and have a nice property

$$GG' \equiv 1/2.$$

It is shown that this resonator is unconditionally confined, absolutely dynamic stable and stable against perturbations.

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12949

CSO: 4009/1083

Physics

AUTHOR: WANG Xingmin [3076 6821 3046]

ORG: None

TITLE: "Cavity Approximation of the Center-of-Mass Bag Model and Low-energy γ -N Scattering"

SOURCE: Hangzhou HANGZHOU DAXUE XUEBAO (ZIRAN KEXUE BAN) [JOURNAL OF HANGZHOU UNIVERSITY (NATURAL SCIENCES EDITION)] in Chinese Vol 12, No 2, Apr 85 pp 194-204

TEXT OF ENGLISH ABSTRACT:

A center-of-mass bag model and its cavity approximation are suggested. In the rest CM-system, the model is equivalent to the MIT bag model, and, together with the freedom-separation rule, it seems to provide a self-consistent, translation-invariant and Lorentz-covariant field-theory, which can readily be quantized and applied to low-energy γ -N scattering.

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CSO: 4009/1083

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